

***STORM SERIES<sup>®</sup>***  
***WHEELCHAIRS***  
***(RWD/MWD/FWD)***

***Arrow<sup>®</sup>***  
***Torque<sup>™</sup> SP***  
***Ranger X<sup>™</sup>***

DEALER: KEEP THIS MANUAL. THE PROCEDURES  
IN THIS MANUAL MUST BE PERFORMED BY AN  
AUTHORIZED DEALER ONLY



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**WARNING**

**THE PROCEDURES IN THIS MANUAL SHOULD ONLY BE PERFORMED BY QUALIFIED TECHNICIAN.**

**DO NOT SERVICE OR OPERATE THIS EQUIPMENT WITHOUT FIRST READING AND UNDERSTANDING THIS MANUAL AND THE OWNERS MANUAL SUPPLIED WITH THE WHEELCHAIR. IF YOU ARE UNABLE TO UNDERSTAND THE WARNINGS, CAUTIONS, AND INSTRUCTIONS, CONTACT INVACARE TECHNICAL SUPPORT BEFORE ATTEMPTING TO SERVICE OR OPERATE THIS EQUIPMENT - OTHERWISE INJURY OR DAMAGE MAY RESULT.**

**SPECIAL NOTES**

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WARNING/CAUTION notices as used in this manual apply to hazards or unsafe practices which could result in personal injury or property damage.

**NOTICE**

THE INFORMATION CONTAINED IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE.

**WHEELCHAIR USER**

As a manufacturer of wheelchairs, Invacare endeavors to supply a wide variety of Action wheelchairs to meet many needs of the end user. However, final selection of the type of wheelchair to be used by an individual rests solely with the user and his/her healthcare professional capable of making such a selection.

**WHEELCHAIR TIE-DOWN RESTRAINTS AND SEAT POSITIONING STRAPS**

Invacare recommends that wheelchair users NOT be transported in vehicles of any kind while in wheelchairs. As of this date, the Department of Transportation has not approved any tie-down systems for transportation of a user while in a wheelchair, in a moving vehicle of any type.

It is Invacare's position that users of wheelchairs should be transferred into appropriate seating in vehicles for transportation and use be made of the restraints made available by the auto industry. Invacare cannot and does not recommend any wheelchair transportation systems.

**AS REGARDS RESTRAINTS - SEAT POSITIONING STRAPS - IT IS THE OBLIGATION OF THE DME DEALER, THERAPISTS AND OTHER HEALTHCARE PROFESSIONALS TO DETERMINE IF A SEATING POSITIONING STRAP IS REQUIRED TO ENSURE THE SAFE OPERATION OF THIS EQUIPMENT BY THE USER. SERIOUS INJURY CAN OCCUR IN THE EVENT OF A FALL FROM A WHEELCHAIR.**

**SAVE THESE INSTRUCTIONS**

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NOTE: The information in this owner's manual applies to the STORM ARROW, \*\* STORM TORQUE, STORM X, JUNIOR MODELS and the RECLINER Wheelchairs except where specified.

NOTE: Procedures 1- 14 apply to rear wheel drive, mid wheel drive and front wheel drive wheelchairs EXCEPT where specified.

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\*\* The Storm Torque model wheelchair is available in rear wheel drive ONLY.

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**SPECIFICATIONS**

**SPECIFICATIONS**

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PHYSICAL DIMENSIONS	❖ARROW	** TORQUE	**TORQUE SP	X	JUNIOR
Seat Width Range: 250 lbs Rating			⊕ 16 to 20-in.		*12 to 16-in.
300 lbs. Rating	<b>MWD/RWD</b> *16 to 22-in.	16 and 18-in.	● 16 to 20-in	*16 to 22-in.	
400 lbs. Rating	<b>MWD/RWD FWD</b> *19 to 24-in. *16 to 24-in.				
Seat Depth Range:	*16 to 22-in.	16 and 18-in.	*16 to 18-in.	*16 to 22-in.	*12 to 15-in. w/CJ Back Expandable to - *16 to 17-in.
Back Height Range:	*16 to 24-in.	16, 18, 20,22-in.	*16 to 22-in.	*16 to 24-in.	*12 to 18-in.
Seat-to-Floor (approximate) Standard: Optional:	<b>MWD/RWD FWD</b> 17-1/2-in. 18-1/4-in. 19-3/4-in. 20-1/2-in. 21-in. 21-3/4-in.	17-1/2-in. 19-3/4-in. N/A	17-1/2-in. 19-3/4-in. N/A	17-1/2-in. 19-3/4-in. 21-in.	<b>Storm Base X Base</b> 17-1/2-in. 17-1/2-in. 19-3/4-in. 19-3/4-in.
Overall Width of Base: (w/o joystick)	24-5/8-in. 25-1/4-in.	24-5/8-in.	24-5/8-in.	24-5/8-in.	
Overall Height Standard: Minimum: Maximum: Recliner - (Std.) Low Seat Frame: Med. Seat Frame: High Seat Frame:	<b>MWD/RWD FWD</b> 34-1/4-in. 35-1/2-in. 34-1/4-in. 35-1/2-in. 44-1/4-in. 45-1/2-in. 51-1/2-in. 52-3/4-in. 53-3/4-in. 55-in. 55-1/2 in. 58-1/2-in.	34-1/4-in. N/A N/A N/A N/A N/A N/A	34-1/4-in. N/A N/A N/A N/A N/A N/A	34-1/4-in. 34-1/4-in. 44-1/4-in. 51-1/2-in. 53-1/4-in. 55-1/2-in.	<b>Storm Base X Base</b> 34-1/4-in. 34-1/4-in. 32-1/4-in. 32-1/4-in. 40-1/2-in. 40-1/2-in. N/A N/A N/A
Overall Length (without front riggings) Standard: Long Frame:	<b>MWD/RWD FWD</b> 32-1/4-in. 35-1/4-in. 35-1/4-in. N/A	32-1/4-in. N/A	32-1/4-in. N/A	32-1/4-in. 35-1/4-in.	32-1/4-in. 35-1/4-in.
Weight Standard Motor W/O Batteries: W/Batteries: Standard Optional Shipping (approx.): Gearless/Brushless Motor W/O Batteries: W/ Batteries: Standard Optional Shipping (approx.):	<b>MWD/RWD FWD</b> 146 lbs. 199 lbs. 248 lbs. 310 lbs. N/A N/A 176 lbs. 229 lbs. 166 lbs. N/A 243 lbs. N/A 268 lbs. N/A 196 lbs. N/A	149 lbs. 224 lbs. 249 lbs. 176 lbs. 169 lbs. 243 lbs. 268 lbs. 196 lbs.	149 lbs. 224 lbs. N/A 176 lbs. N/A N/A N/A N/A	149 lbs. 224 lbs. 249 lbs. 176 lbs. 169 lbs. 243 lbs. 268 lbs. 196 lbs.	<b>Storm Base X Base</b> 146 lbs. 149 lbs. 246 lbs. 224 lbs. N/A 249 lbs. 176 lbs. 176 lbs. 166 lbs. 169 lbs. 266 lbs. 243 lbs. N/A 268 lbs. 196 lbs. 196 lbs.
Drive Axle:	*◆Adjustable (MWD/RWD only)		*◆Adjustable	*◆Adjustable	*◆Adjustable *Adjustable
Drive Wheels/Tires: (Foam Filled or Pneumatic) Standard: Optional:	14 X 3-in. 14 X 3-in. 14 X 4-in. 14 X 4-in.	14 X 3-in. 14 X 4-in.	14 X 3-in. 14 X 4-in.	14 X 3-in. 14 X 4-in.	14 X 3-in. 14 X 4-in.

\* in 1-inch increments

\*\* Storm Torque/Torque SP model wheelchairs are available in rear wheel drive ONLY. Gearless Brushless Motor Option is available on Storm Torque ONLY.

⊕ With MKIV RII Controller. ● With MKIV Rx or A Controller. ◆ Non-Recliners ONLY.

❖ Arrow specifications refer to RWD, MWD and FWD wheelchairs except where specified.

# SPECIFICATIONS (Continued)

PHYSICAL DIMENSIONS	❖ARROW	** TORQUE	**TORQUE SP	X	JUNIOR
<b>Casters w/Precision Sealed Bearings</b>					
<i>Semi-Pneumatic</i>	▲ <b>300 lbs. Rating</b>				
<b>Standard:</b>	8 X 1-3/4-in.	8 X 1-3/4-in.	8 X 1-3/4-in.	8 X 1-3/4-in.	8 X 1-3/4-in.
<b>Option:</b>	6 X 2-in.	6 X 2-in.	6 X 2-in.	6 X 2-in.	6 X 2-in.
<i>Pneumatic or Foam Filled</i>					
<b>Standard:</b>	8 X 2-in.	8 X 2-in.	8 X 2-in.	8 X 2-in.	8 X 2-in.
<b>Option:</b>	9 X 2-3/4-in.	9 X 2-3/4-in.	9 X 2-3/4-in.	9 X 2-3/4-in.	9 X 2-3/4-in.
<i>Pneumatic or Foam Filled</i>	<b>400 lbs. Rating (RWD,MWD only)</b>				
<b>Standard:</b>	9 X 2-3/4-in.				
<b>Option:</b>	8 X 2-in.				

❖ARROW, ** TORQUE, **TORQUE SP, X and JUNIOR	
<b>Anti-Tippers (3-inch wheels):</b>	Standard (N/A on FWD)
<b>Caster Forks:</b>	Standard, Shock Fork (Optional)
<b>Footrest:</b>	Telescoping Front Rigging Supports, Swing-Away (Standard), Heavy Duty (Optional), 4-inch Longer Pivot Slide Tube (Optional)
<b>Armrests:</b>	Flip Back, Fixed or Adjustable Height (Desk and Full Length)
<b>Seat Angle Adjustment:</b>	Adjustable (0° to 10°)
<b>Back Angle Adjustment:</b>	Adjustable (80° to 100° in 5° increments)
<b>Seat Cushion:</b>	Cushion (Optional)
<b>Chair Upholstery Options:</b>	Naugahyde and Nylon
<b>Battery/Size (Not Supplied):</b>	<b>BASE FRAMES</b> ◆STD BATTERIES      ◆OPT BATTERIES
<b>Two (2) Required (◆Gel Batteries)</b>	Arrow w/ Standard motor      Group 24      N/A
	- w/ **Gearless/Brushless motor      Group 22      Group 24
	Torque w/ Standard Motor      Group 22      Group 24
	- w/ Gearless/Brushless motor      Group 22      Group 24
	**Torque SP w/ Standard Motor      Group 22      N/A
	Ranger X w/Standard Motor      Group 22      Group 24
	- w/ Gearless/Brushless motor      Group 22      Group 24

PERFORMANCE	ARROW	**TORQUE	**TORQUESP	X	JUNIOR	
<b>Speed (M.P.H.):</b>	0 to 5-3/4 (300 lbs. rating) RWD,MWD 0 to 4-1/4 (400 lbs. rating) RWD,MWD *0 to 7-1/4 (300 lbs. rating)RWD,MWD 0 to 4 (400 lbs. rating) FWD	0 to 6-1/2  *0 to 7-1/4	0 to 4-1/4	0 to 6-1/2  *0 to 7-1/4	<b>Arrow Base</b> 0 to 6-1/2 *0 to 7-1/4	<b>X Base</b> 0 to 6-1/2 *0 to 7-1/4
<b>***Range(miles): (◆Gel Batteries)</b>	up to 19 - RWD,MWD *up to 29 (Std) - RWD,MWD *up to 29 (Opt) - RWD,MWD up to 16 - FWD	up to 16 (Std) up to 19 (Opt) *up to 29 (Std) *up to 35 (Std)	Up to 16	up to 16 (Std) up to 19 (Opt) *up to 29 (Std) *up to 35 (Opt)	up to 19 *up to 29 (Std) *up to 35 (Opt)	up to 23 (Std) up to 19 (Opt) *up to 29 (Std) up to 35 (Opt)
<b>Weight Limitation:</b>	300 lbs. (Standard Unit); 400 lbs. (FWD) *300 lbs. (Standard Unit)RWD,MWD 400 lbs. (Heavy Duty Unit) RWD,MWD	300 lbs. *300 lbs.	⊕ 250 lbs. ● 300 lbs.	300 lbs.  *300 lbs.	250 lbs.	250 lbs.

NOTE: Information below is unique to the Recliner. Refer to Arrow, X, Torque, and Torque SP for complete specifications.

RECLINER	Widths	Depths	Back Heights	Weight Limits (LBS.)	Back Angle Range
	14 to 24-in.	16 to 22-in.	18-1/2 to 26-in.	<b>Arrow Base</b> -300 Std./400 Optional ⊕ <b>Torque SP Base</b> - 250 <b>X, Torque,● Torque SP Base</b> - 300 <b>Arrow, X, Torque Base W/ Gearless/ Brushless Motor</b> - 300 lbs.	90° to 170°

\* With gearless/brushless motor option.

\*\* Storm Torque/Torque SP wheelchairs are available in rear wheel drive ONLY. Gearless Brushless Motor Option is available on Storm Torque ONLY.

\*\*\*Range will vary with battery conditions, surface, terrain and operators weight.

⊕ With MKIV RII Controller.

● With MKIV Rx or A Controller.

❖ Arrow specifications refer to RWD, MWD and FWD wheelchairs except where specified.

▲ Arrow FWD has a 400 lb. rating.

<i><b>This Procedure Includes the Following:</b></i>
<i><b>Repair or Service Information</b></i>
<i><b>Operating Information</b></i>

**REPAIR OR SERVICE INFORMATION**

Set-up of the Electronic Control Unit is to be performed **ONLY** by individuals certified by Invacare. The final tuning adjustments of the controller may affect other activities of the wheelchair. Damage to the equipment could occur under these circumstances. If non-certified individuals perform any work on these units, the warranty is void.

**OPERATING INFORMATION**

**GENERAL WARNINGS**

Performance adjustments should only be made by professionals of the healthcare field or persons fully conversant with this process and the driver's capabilities. Incorrect settings could cause injury to the driver, bystanders, damage to the chair and to surrounding property.

After the wheelchair has been set-up, check to make sure that the wheelchair performs to the specifications entered during the set-up procedure. If the wheelchair does **NOT** perform to specifications, turn the wheelchair **OFF** immediately and reenter set-up specifications. Repeat this procedure until the wheelchair performs to specifications.

**DO NOT** use parts, accessories, or adapters other than those authorized by Invacare.

**TIRE PRESSURE**

**DO NOT** use your wheelchair unless it has the proper tire pressure (P.S.I.). **DO NOT** overinflate the tires. Failure to follow these suggestions may cause the tire to explode and cause bodily harm. The recommended tire pressure is listed on the side wall of the tire.

**ELECTRICAL**

Grounding Instructions:

**DO NOT**, under any circumstances, cut or remove the round grounding prong from any plug used with or for Invacare products. Some devices are equipped with three-prong (grounding) plugs for protection against possible shock hazards. Where a two-prong wall receptacle is encountered, it is the personal responsibility and obligation of the customer to contact a qualified electrician and have the two-prong receptacle replaced with a properly grounded three-prong wall receptacle in accordance with the National Electrical Code. If you must use an extension cord, use **ONLY** a three-wire extension cord having the same or higher electrical rating as the device being connected. In addition, Invacare has placed **RED/ORANGE WARNING TAGS** on some equipment. **DO NOT** remove these tags. Carefully read battery/battery charger information prior to installing, servicing or operating your wheelchair.

**BATTERIES**

The warranty and performance specifications contained in this manual are based on the use of deep cycle gel cell or sealed lead acid batteries. Invacare strongly recommends their use as the power source for this unit.

Battery connecting cables are **NOT** interchangeable. Battery connecting cables with single fuse setup **MUST** only be used on wheelchairs with conventional motor/gearbox assembly. Otherwise, damage may result. Refer to **INSTALLING/REMOVING BATTERIES INTO/FROM BATTERY BOX(ES)** in **PROCEDURE 9** of this manual.

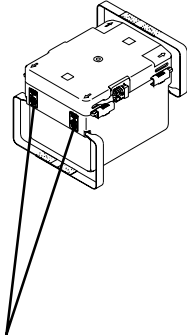
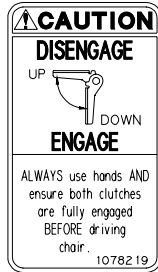
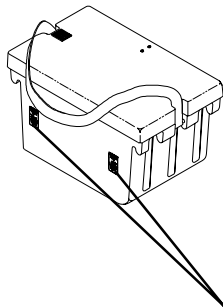


# WARNING/CAUTION LABEL LOCATION - RWD MODELS

NOTE: These caution labels are only found on battery boxes used with the gearless/brushless motor

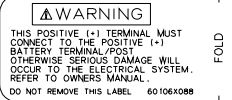
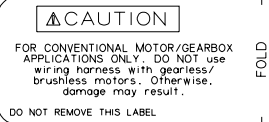
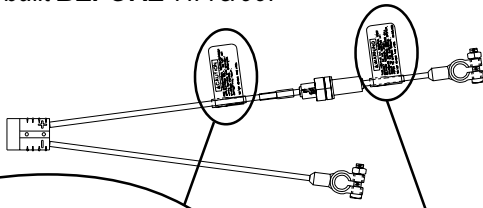
GROUP 24 BATTERIES

GROUP 22 BATTERIES



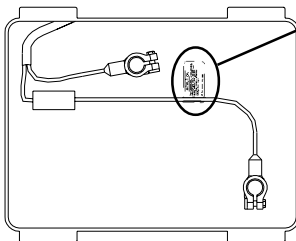
## ONE (1) CONNECTOR BATTERY BOX WIRING HARNESS

NOTE: This wiring harness is found on wheelchair models built **BEFORE** 11/15/99.



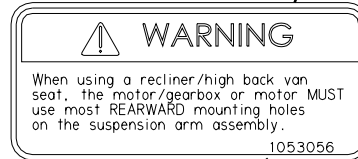
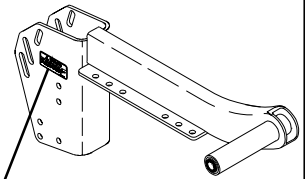
NOTE: This caution label is only found on wiring harnesses used with the conventional motor/gearbox application.

NOTE: This wiring harness is found on wheelchair models built **AFTER** 11/15/99.

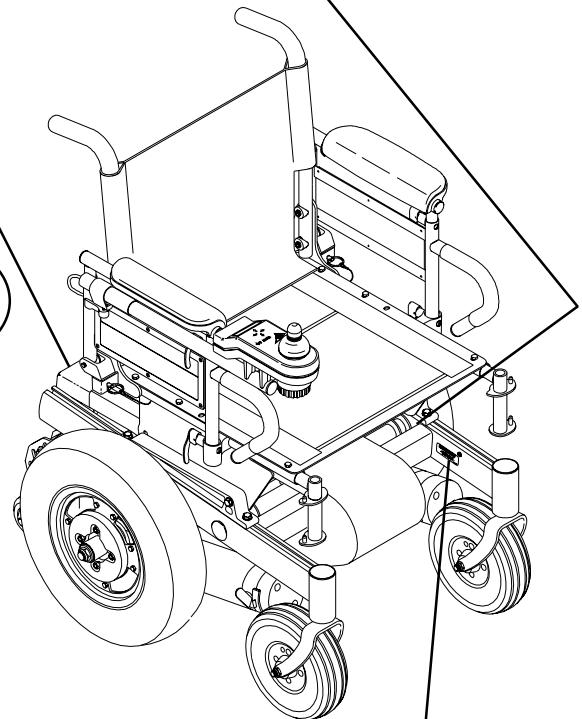
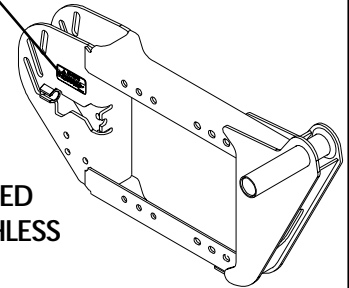


NOTE: For models with the gearless/brushless motor, read the manufacturer's **CAUTION LABEL** located on side of the motor. (Drive wheel must be removed to view caution label.)

SUSPENSION ARM USED WITH CONVENTIONAL MOTOR/GEARBOX ASSEMBLY



SUSPENSION ARM USED WITH GEARLESS/BRUSHLESS MOTOR



NOTE: **WARNING LABEL** also found on side frame near the rear of the chair.



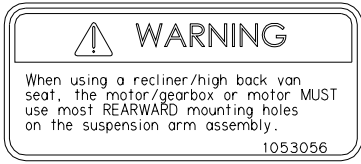
This stop **MUST** be in place before use. DO NOT remove.

1070497

GENERAL GUIDELINES

# WARNING/CAUTION LABEL LOCATION

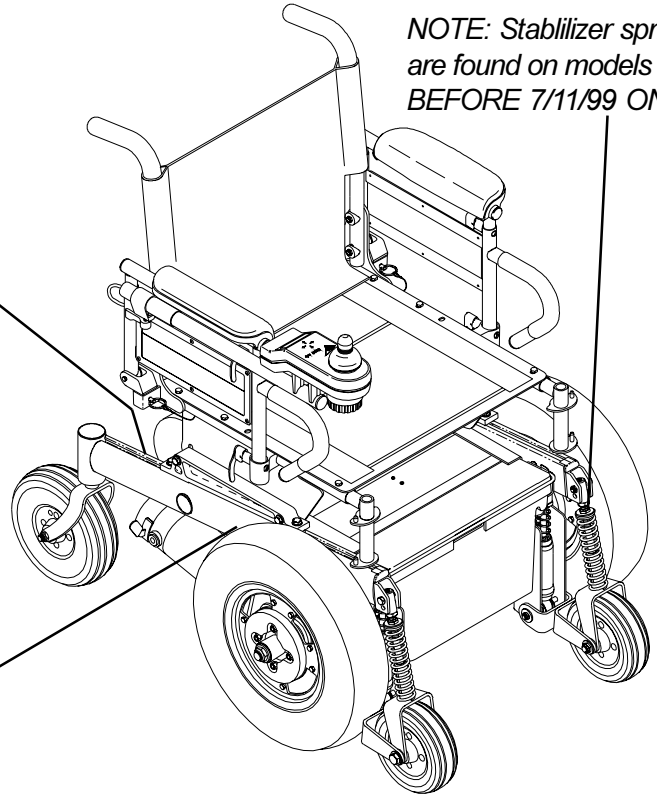
## MWD MODELS



**NOTE: CAUTION LABEL** also found on side frame near the front of the chair.

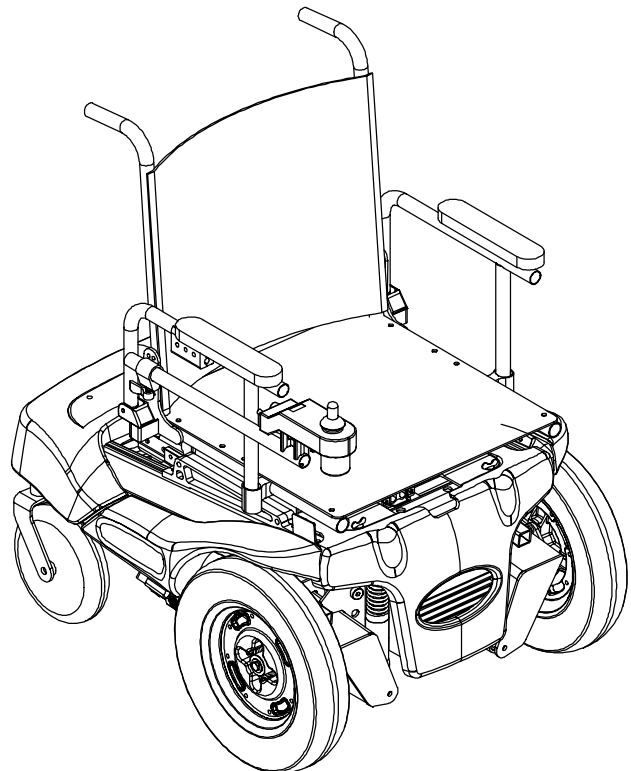
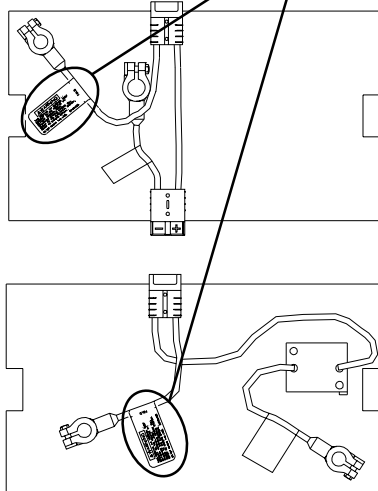
**NOTE:** Stabilizer springs are found on models built BEFORE 7/11/99 ONLY.

Suspension Arm  
(located on inside of drive wheel)



## FWD MODELS

### BATTERY BOX WIRING HARNESS



**This Procedure Includes the Following:****Field Load Test****Using Hydrometer To Check Battery Cells (Lead Acid)****Motor Testing****Motor Brush Inspection****Electro-Mechanical Parking Brake Testing****FIELD LOAD TEST (FIGURE 1)**

*NOTE: The following test can also be performed through the controller of the wheelchair along with a remote programmer. Refer to the individual **CONTROLLER MANUAL** supplied with each wheelchair.*

Old batteries lose their ability to store and release power, due to increased internal resistance. This means that as you try to take power from the battery, some of that power is used up in the process of passing through the battery, resulting in less voltage at the posts. The more power drawn, the lower the voltage available. When this lost voltage drops the output 1.0 volts under load (2.0 for a pair), replace the batteries.

Testing under load is the only way to spot this problem. While special battery load testing equipment is available, it is costly and difficult to transport.

Use a digital voltmeter to check battery charge level at the charger connector. It is located on the base of the wheelchair frame.

*NOTE: **READ** the instructions **CAREFULLY** before using the digital voltmeter.*

*NOTE: Invacare recommends that **ONLY** qualified service personnel perform this test.*

1. Ensure that power is OFF.
2. Make sure battery is fully charged. An extremely discharged battery will exhibit the same symptoms as a bad one.
3. Remove the footrests from the wheelchair and perform one (1) of the following:
  - A. **RWD MODELS** - place the CASTERS of the wheelchair against a wall, workbench or other stationary object.
  - B. **MWD MODELS** - place the STABILIZER wheels of the wheelchair against a wall, workbench or other stationary object.
  - C. **FWD MODELS** - place the DRIVE wheels of the wheelchair against a wall, workbench or other stationary object.

4. Place the voltmeter leads into the charger plug on the wheelchair. Most digital voltmeters are not affected by polarity, however, analog meters (meters with swinging needles) can be and should be used carefully. A good meter reading should be 25.5 to 26 VDC.
5. Have two (2) individuals (one [1] on each arm) apply as much downward pressure as possible on the arms of the wheelchair.
6. Turn the wheelchair ON and push the joystick forward, trying to drive the wheelchair through the stationary object. This puts a heavy load on the batteries as they try to push through the stationary object. Read the meter while the motors are straining to determine the voltage under load.

*NOTE: If the voltage drops to less than 23.5 volts from a pair of fully charged batteries while under load, they should be replaced regardless of the unloaded voltages.*

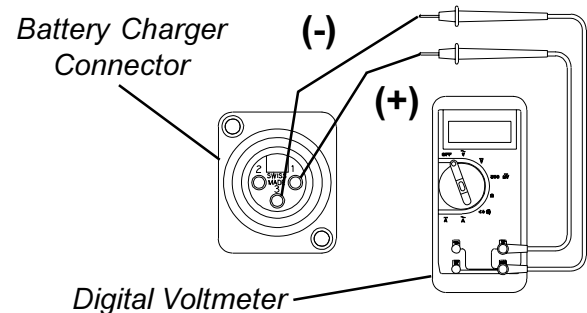


FIGURE 1 - FIELD LOAD TEST

**USING HYDROMETER TO CHECK BATTERY CELLS (LEAD ACID) (FIGURE 2)**

*NOTE: Perform this procedure when a digital voltmeter is not available.*

**WARNING**

**NEVER** smoke or strike a match near the batteries. If the caps of the battery cells are removed, **NEVER** look directly into them when charging the battery.

The use of rubber gloves and chemical goggles or face shields is recommended when working with batteries.

**WARNING**

When reading a hydrometer, DO NOT allow any liquid to come in contact with your eyes or skin. It is a form of acid and can cause serious burns, and in some cases, blindness. If you do get battery acid on you, flush the exposed areas with cool water IMMEDIATELY. If the acid comes into contact with eyes or causes serious burns, get medical help IMMEDIATELY.

The battery acid can damage your wheelchair, clothing, and household items. Therefore, take readings cautiously and only in designated areas.

ONLY use distilled water when topping off the battery cells.

Most batteries are not sold with instructions. However, warnings are frequently noted on the cell caps. Read them carefully.

1. Remove the battery box(es). Refer to INSTALLING/REMOVING BATTERY BOXES - GROUP 24 BATTERY BASE FRAMES or INSTALLING/REMOVING BATTERY BOX - GROUP 22 BATTERY BASE FRAMES in PROCEDURE 9 of this manual.

2. Remove the battery caps from the battery.
3. Squeeze the air from the hydrometer.
4. Place the hydrometer into a battery cell.

*NOTE: DO NOT fill hydrometer more than 3/4 full.*

5. Draw up sufficient acid to cover float balls.
6. Tap lightly to remove air bubbles.
7. Number of floating balls indicates charge.

**Number of Floating Balls**

0	Discharged
1	25% Charged
2	50% Charged
3	75% Charged
4	100% Charged
* 5	Overcharged

\* Check charging system.

8. Flush the liquid back into the same cell after reading the float. Repeat this step until all cells have been properly read. A shorted or dead cell can be detected when it is the only cell that does not charge.

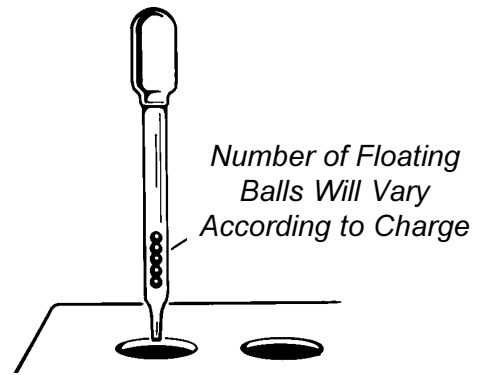


FIGURE 2 - USING HYDROMETER TO CHECK BATTERY CELLS (LEAD ACID)

9. Flush hydrometer in cold running water by allowing the water to rise into hydrometer as far as possible. Do this several times to guard against burn damage.
10. Replace the battery caps.
11. Reinstall battery boxes. Refer to INSTALLING/REMOVING BATTERY BOXES - GROUP 24 BATTERY BASE FRAMES or INSTALLING/REMOVING BATTERY BOX - GROUP 22 BATTERY BASE FRAMES in PROCEDURE 9 of this manual.

**MOTOR TESTING (FIGURE 3)**

*NOTE: This procedure should only be performed on wheelchairs with the conventional motor/gearbox assembly. For gearless/brushless motors, there are no serviceable parts. Return motor to manufacturer for testing.*

1. On the 4-pin motor connector, locate the two (2) contacts in the red and black housings.
2. Set the digital multimeter to measure ohms ( $\Omega$ ).
3. Measure the resistance between the two (2) motor contacts.

*NOTE: A normal reading is between 1 and 5 ohms ( $\Omega$ ). A reading of 0 ohms ( $\Omega$ ) or in excess of 15 ohms ( $\Omega$ ) indicates a problem. High readings are generally caused by bad connections and/or damaged brushes. Contact authorized dealer or Invacare.*

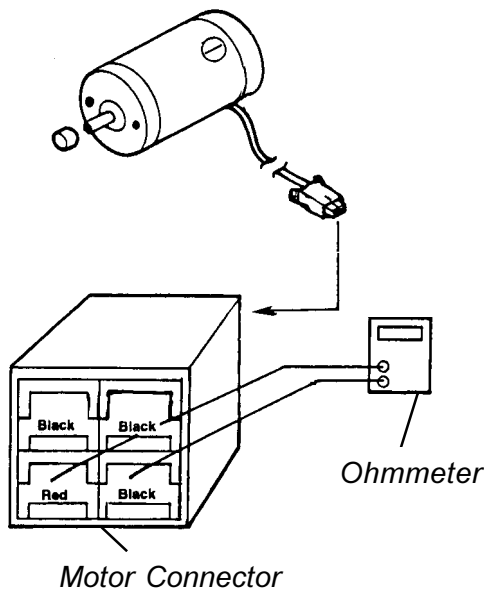


FIGURE 3 - MOTOR TESTING

**MOTOR BRUSH INSPECTION (FIGURE 4)**

*NOTE: This procedure should only be performed on wheelchairs with conventional motor/gearbox assembly.*

There are two (2) contact brushes on ACTION STORM motors located under the brush caps on the motor housing. If these caps are hard to remove they are either overtightened or the motor has become very hot. Let motors cool. If caps still cannot be removed, it is recommended that the motor be sent to Invacare Technical Services for inspection/repair.

*NOTE: It is very important to note which way the brush comes out of the motor. The brush **MUST** be placed into the motor exactly the same way to ensure good contact with the commutator.*

1. Once the motor brush caps have been removed, pull the brushes out of the motor. The end of the brushes should be smooth and shiny and the spring should not be damaged or discolored. If one or both of the brushes are damaged, only the damaged or worn brushes need be replaced. It is very important that any time a brush is replaced, it must be "burned in". This is accomplished by running the motor for one hour in each direction with a half hour break in-between. This should also be done with little or no load on the motor, i.e., put the wheelchair up on blocks so the drive (large) wheels do not contact the ground and run the wheelchair. A motor with only one brush replaced will only carry a small percentage of its rated load capacity until the NEW brush is burned in.

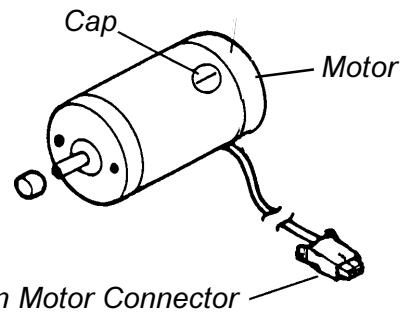


FIGURE 4 - MOTOR BRUSH INSPECTION

**ELECTRO-MECHANICAL PARKING BRAKE TESTING (FIGURE 5)**

*NOTE: This procedure should only be performed on wheelchairs with conventional motor/gearbox assembly.*

1. On the four-pin motor connector, locate the side by side connectors in the black housings.
2. Set the digital multimeter to read ohms ( $\Omega$ ).
3. Measure the resistance between the two (2) brake contacts. A normal reading is 100 ohms ( $\Omega$ ). A reading of 0 ohms ( $\Omega$ ) or a very high reading; i.e., MEG ohms or O.L. (out of limit) indicates a shorted brake or an open connection respectively. If either condition exists, send the motor to Invacare Technical Service for inspection/repair.

**CAUTION**

A shorted electro-mechanical brake will damage the brake output section in the controller. **DO NOT** connect a shorted electro-mechanical brake to a good controller module. A shorted brake **MUST** be replaced.

*NOTE: A bad motor can damage the controller module but a bad controller will NOT damage a motor.*

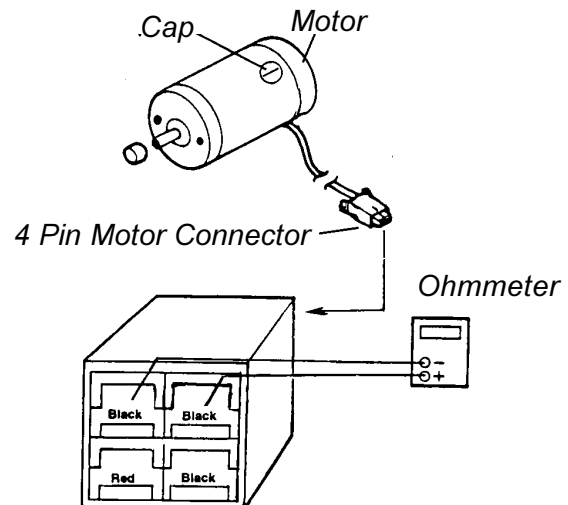
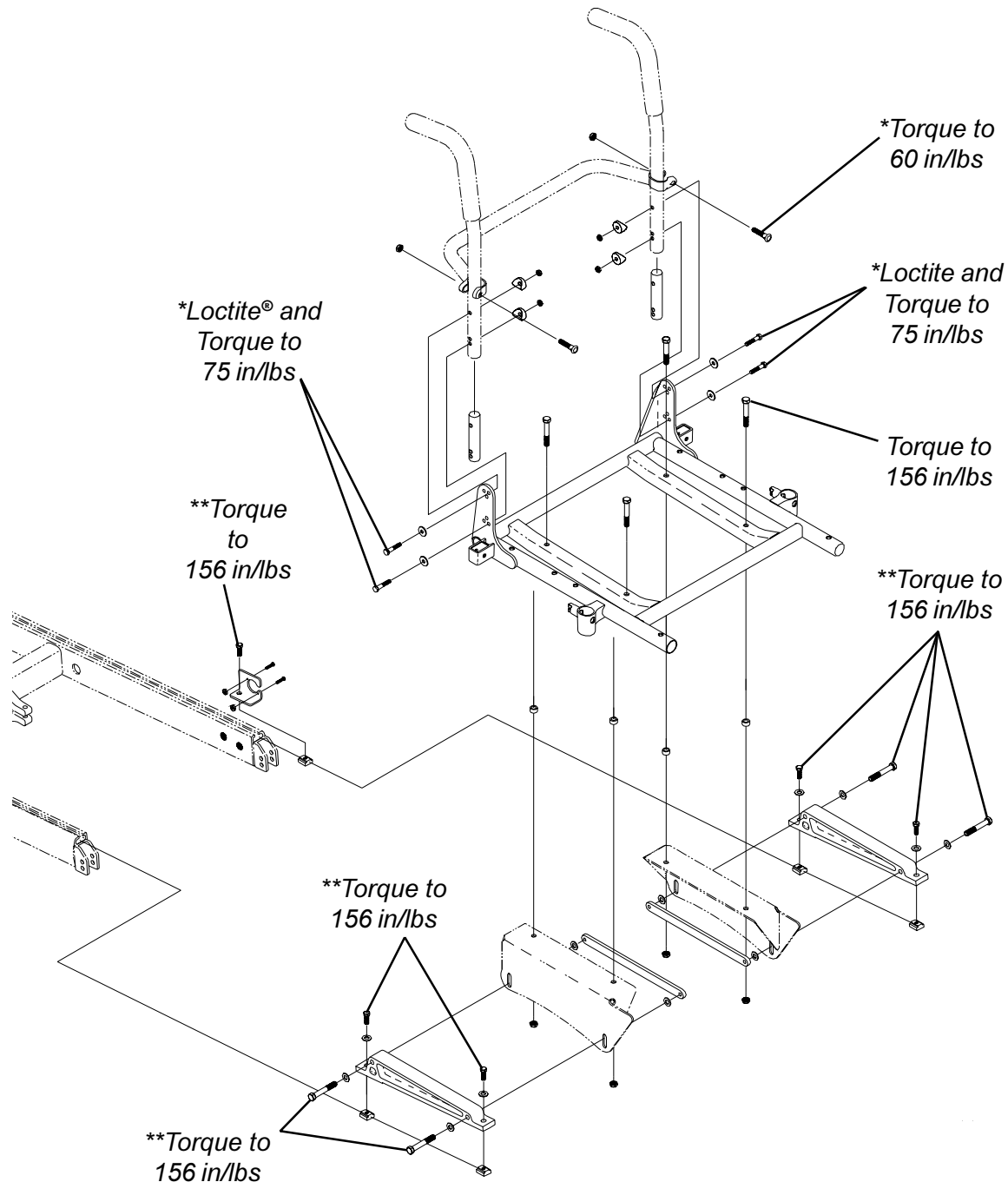


FIGURE 5 - ELECTRO-MECHANICAL PARKING BRAKE TESTING

# HARDWARE TORQUE SPECIFICATIONS

## STANDARD SEAT FRAME

T  
O  
R  
Q  
U  
E  
S  
P  
E  
C  
I  
F  
I  
C  
A  
T  
I  
O  
N  
S



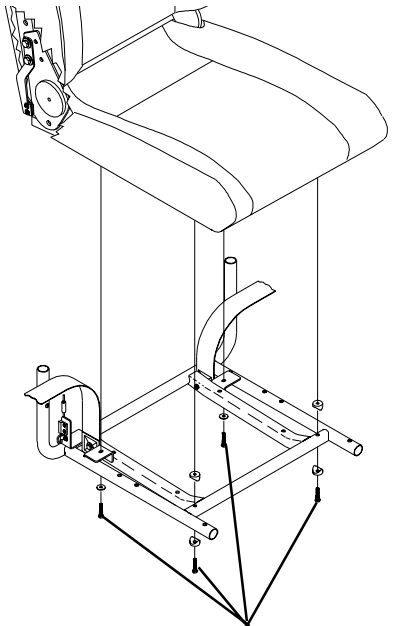
**NOTE:**

- \* These torque specifications also apply to the adjustable seat frame assembly.
- \*\* These torque specifications also apply to the captains van seat and adjustable seat frame assemblies.

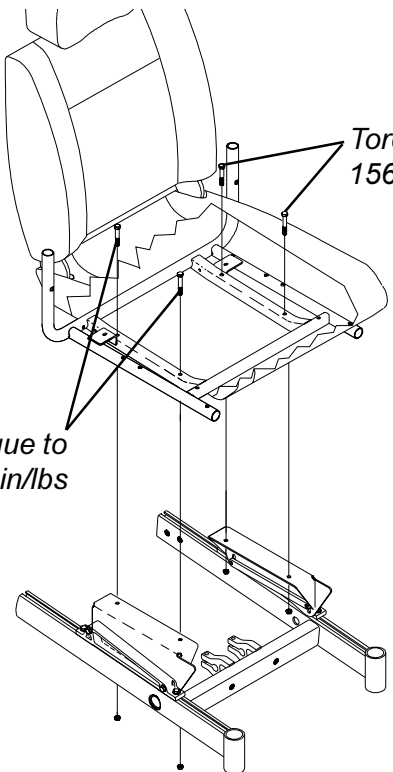
# HARDWARE TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

## \*CAPTAINS VAN SEAT



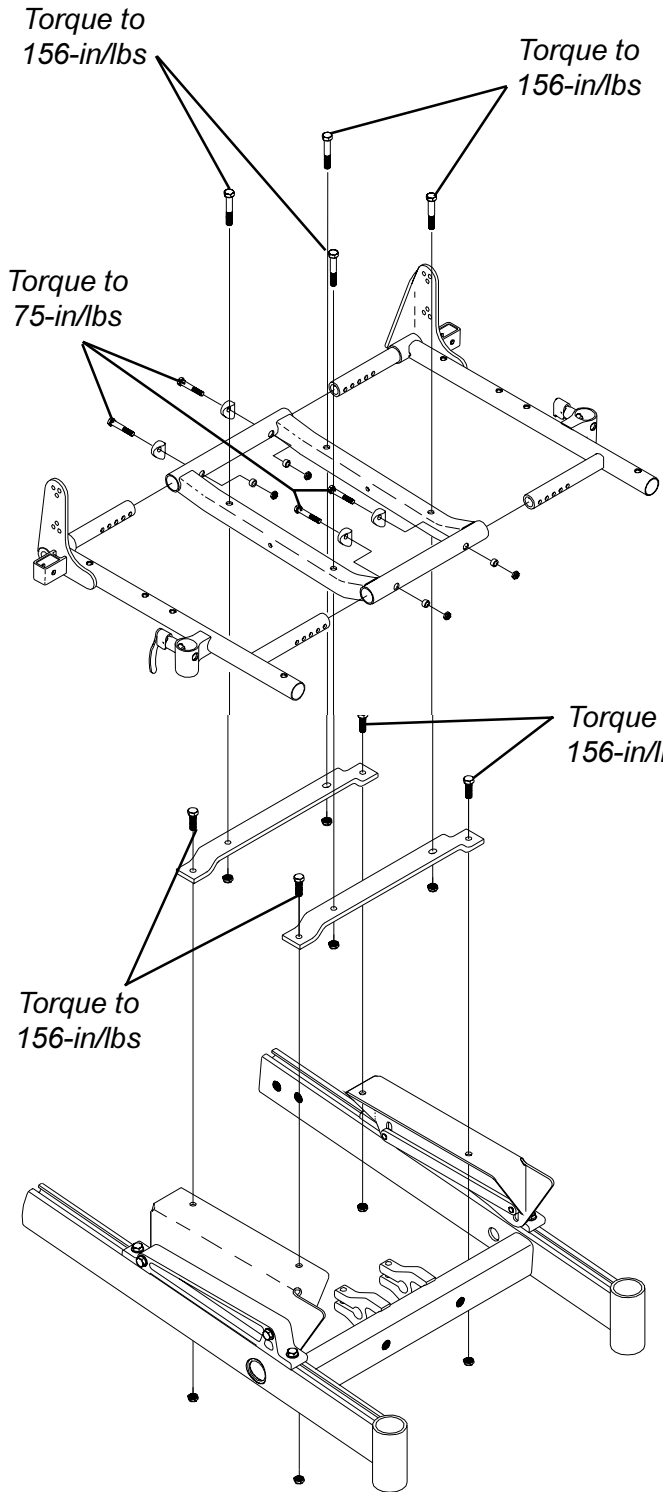
Loctite and Torque to 75 in/lbs



Torque to 156 in/lbs

Torque to 156 in/lbs

## \*ADJUSTABLE SEAT FRAME



Torque to 156-in/lbs

Torque to 156-in/lbs

Torque to 75-in/lbs

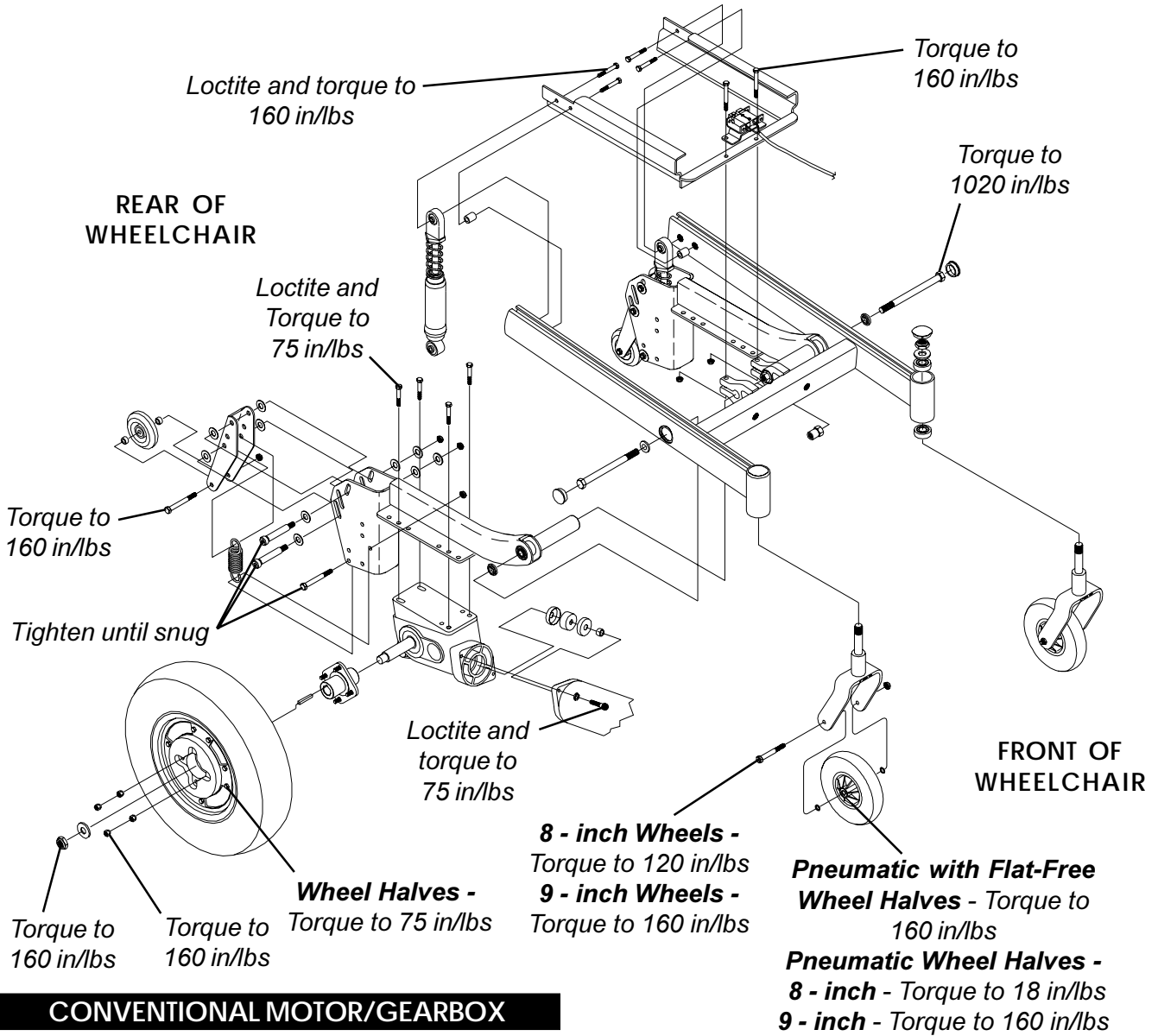
Torque to 156-in/lbs

Torque to 156-in/lbs

\* NOTE: For additional torque specifications, refer to the torque specifications drawing for the standard seat frame assembly.

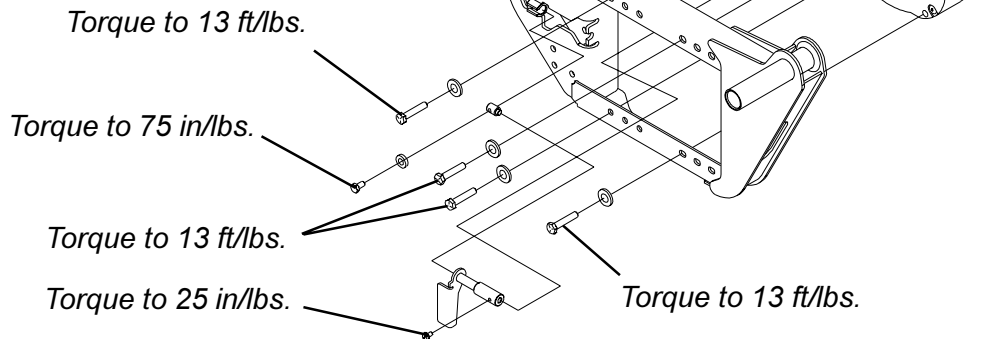
# REAR WHEEL DRIVE BASE FRAME HARDWARE TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS



## GEARLESS/BRUSHLESS MOTOR

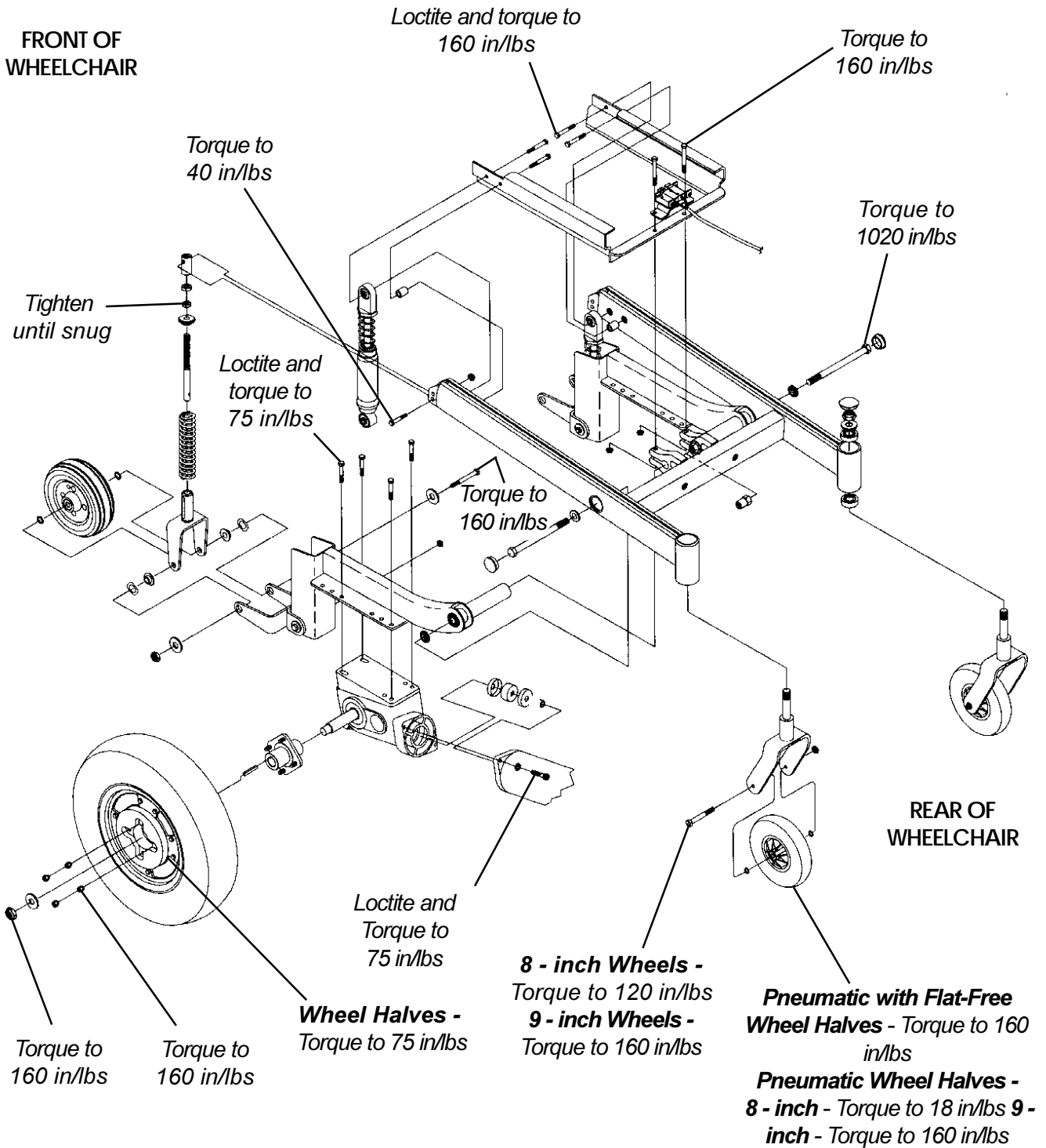
NOTE: All torque specifications called out for the conventional motor/gearbox assembly are applicable to the gearless/brushless motor except for the following:





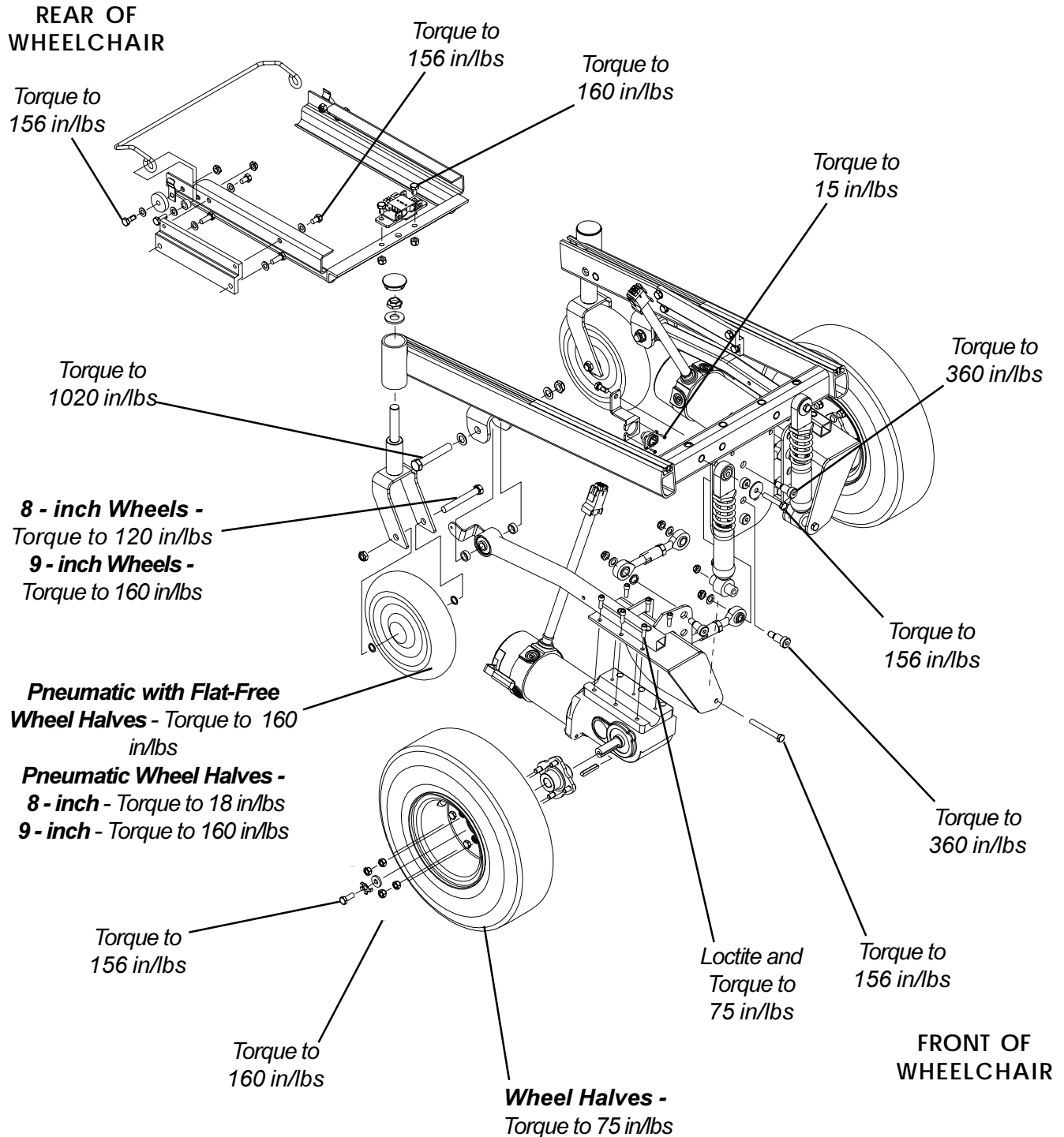
# MID-WHEEL DRIVE BASE FRAME HARDWARE TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS



# FRONT-WHEEL DRIVE BASE FRAME HARDWARE TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS



***This Procedure Includes the Following:***

***Replacing Armrest Pads - Captains Van Seats***

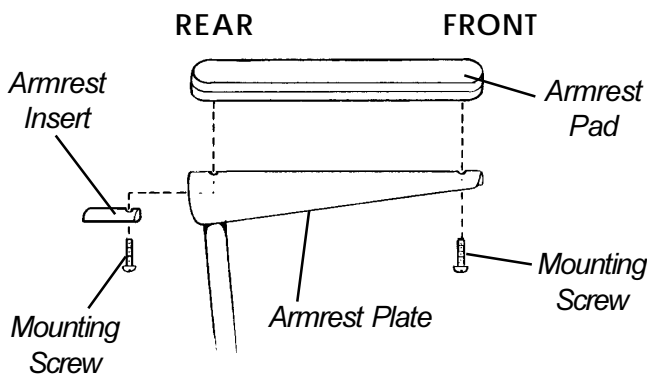
***Replacing Captains Van Seat Armrest Plate***

### WARNING

After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

## REPLACING ARMREST PADS - CAPTAINS VAN SEATS (FIGURE 1)

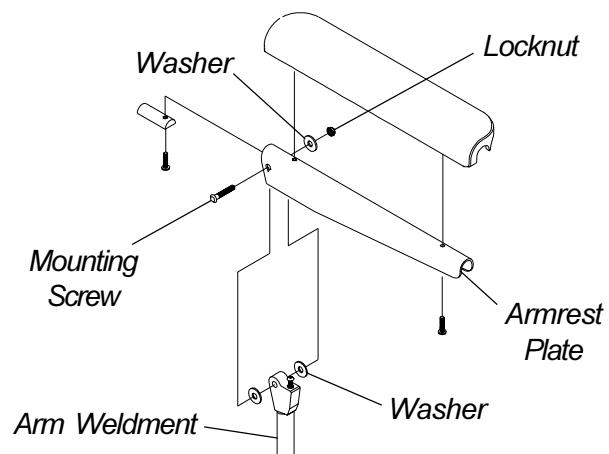
1. Remove the mounting screws that secures the front of the armrest pad to the armrest plate.
2. Remove the mounting screw that secures the rear of the armrest pad and armrest insert to the armrest plate.
3. Remove the existing armrest pad and position the **NEW** armrest pad on the armrest plate.
4. Line up the mounting holes in the armrest insert, armrest plate and **NEW** armrest pad.
5. Reinstall the rear mounting screw through the armrest insert, armrest plate and armrest pad and tighten securely.
6. Reinstall the front mounting screw into the armrest plate and **NEW** armrest pad and tighten securely.



**FIGURE 1 - REPLACING ARMREST PADS - CAPTAINS VAN SEATS**

## REPLACING CAPTAINS VAN SEAT ARMREST PLATE (FIGURE 2)

1. If necessary, remove the three (3) mounting screws, spacers and locknuts that secure the joystick mounting bracket to the armrest plate.
2. Remove armrest pad. Refer to REPLACING ARMREST PADS - CAPTAINS VAN SEATS in this procedure of the manual.
3. Remove the mounting screw, washers and locknut that secure the existing armrest plate to the arm weldment.
4. Position the **NEW** armrest plate on the armrest weldment and secure with the mounting screw, washers, and locknut. Refer to FIGURE 2 for correct hardware orientation.
5. Reinstall van style armrest pad. Refer to REPLACING ARMREST PADS - CAPTAINS VAN SEATS in this procedure of the manual.
6. If necessary, reinstall the three (3) mounting screws, spacers and locknuts that secure the joystick mounting bracket to the armrest plate.
7. Repeat STEPS 1-6 for the opposite armrest plate, if necessary.



**FIGURE 2 - REPLACING CAPTAINS VAN SEAT ARMREST PLATE**

**This Procedure Includes the Following:**  
**Replacing Seat Positioning Strap - Captains Van Seats**  
**Replacing Back Upholstery**

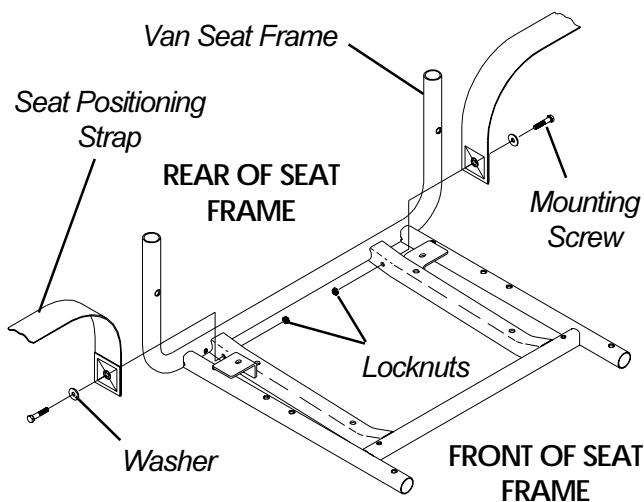
**WARNING**  
 After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

**REPLACING SEAT POSITIONING STRAP - CAPTAINS VAN SEATS (FIGURE 1)**

1. Remove the van style seat from the van seat frame. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in PROCEDURE 6 of this manual.
2. Remove the two (2) rear mounting screws, washers, and locknuts that secure the seat positioning straps to the van seat frame.

*NOTE: The washer is positioned between the seat positioning strap and the mounting screw.*

3. Secure the **NEW** seat positioning strap halves with the mounting screws, washers and locknuts to the van seat frame and torque to 75-inch pounds.
4. Reinstall the van style seat to the van seat frame. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in PROCEDURE 6 of this manual.



**FIGURE 1 - REPLACING SEAT POSITIONING STRAP - CAPTAINS VAN SEATS**

**REPLACING BACK UPHOLSTERY (FIGURE 2)**

1. Remove one (1) armrest from the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.
2. If applicable, remove the two (2) mounting screws and locknuts that secure the spreader bar to the back canes.
3. Remove the two (2) mounting screws and washers that secure the existing back upholstery to the back canes.
4. Cut the tie-wraps that secure the bottom of the existing back upholstery to the back canes.

*NOTE: Note the back angle before disassembly for proper reinstallation.*

5. On the side of the wheelchair that the armrest was removed, remove one (1) of the mounting screws, washer, spacer, and locknut that secures the back cane to the seat frame.

*NOTE: To avoid losing the insert in each back cane, thread the mounting screw just removed through the cane from the inside of the wheelchair to hold the insert in place.*

6. Remove the other mounting screw, washer, spacer, and locknut that secures the back cane to the seat frame.
7. Slide the back cane out of the spreader bar (if applicable) and the existing back upholstery.
8. Remove other armrest from the chair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.
9. Repeat STEPS 5-7 for the opposite side of the wheelchair.
10. Slide the other back cane out of the spreader bar (if applicable) and the existing back upholstery.
11. Slide one(1) back cane into NEW back upholstery and through spreader bar (if applicable).
12. Secure back cane to the seat frame from the outside of the wheelchair with the existing two (2) mounting screws, washers, spacers, and locknuts. Use Loctite 242 and torque to 75-in/lbs.
13. Repeat STEPS 11-12 for opposite back cane.
14. Secure the top of the **NEW** back upholstery to the back canes with the two (2) existing mounting screws.

NOTE: When replacing the back upholstery, back assembly or changing back height, follow these guidelines for spreader bar height:

STANDARD MODELS	
BACK HEIGHT	◆ SPREADER BAR HEIGHT
16-inches*	5-inches
17-inches*	5-inches
18-19-inches*	7-inches
20-24-inches	7-inches

NOTE: Spreader Bar required on ALL back heights between 20-24-inches. \*Spreader bar required on back heights 16, 17, 18, or 19 ONLY if the width or depth of the chair exceeds 19-inches.

◆ Height of Spreader Bar from Bottom of Back Canes to Top of Spreader Bar Clamp.

HEAVY DUTY MODELS

NOTE: Spreader bar required on all back heights.

BACK HEIGHT	◆ SPREADER BAR HEIGHT
16-17-inches	5-inches
18-24-inches	7-inches

◆ Height of Spreader Bar from Bottom of Back Canes to Top of Spreader Bar Clamp.

- If applicable, reposition the spreader bar at the correct height for the corresponding back height and torque the mounting hardware to 60-in/lbs.
- Reinstall the armrest onto the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.

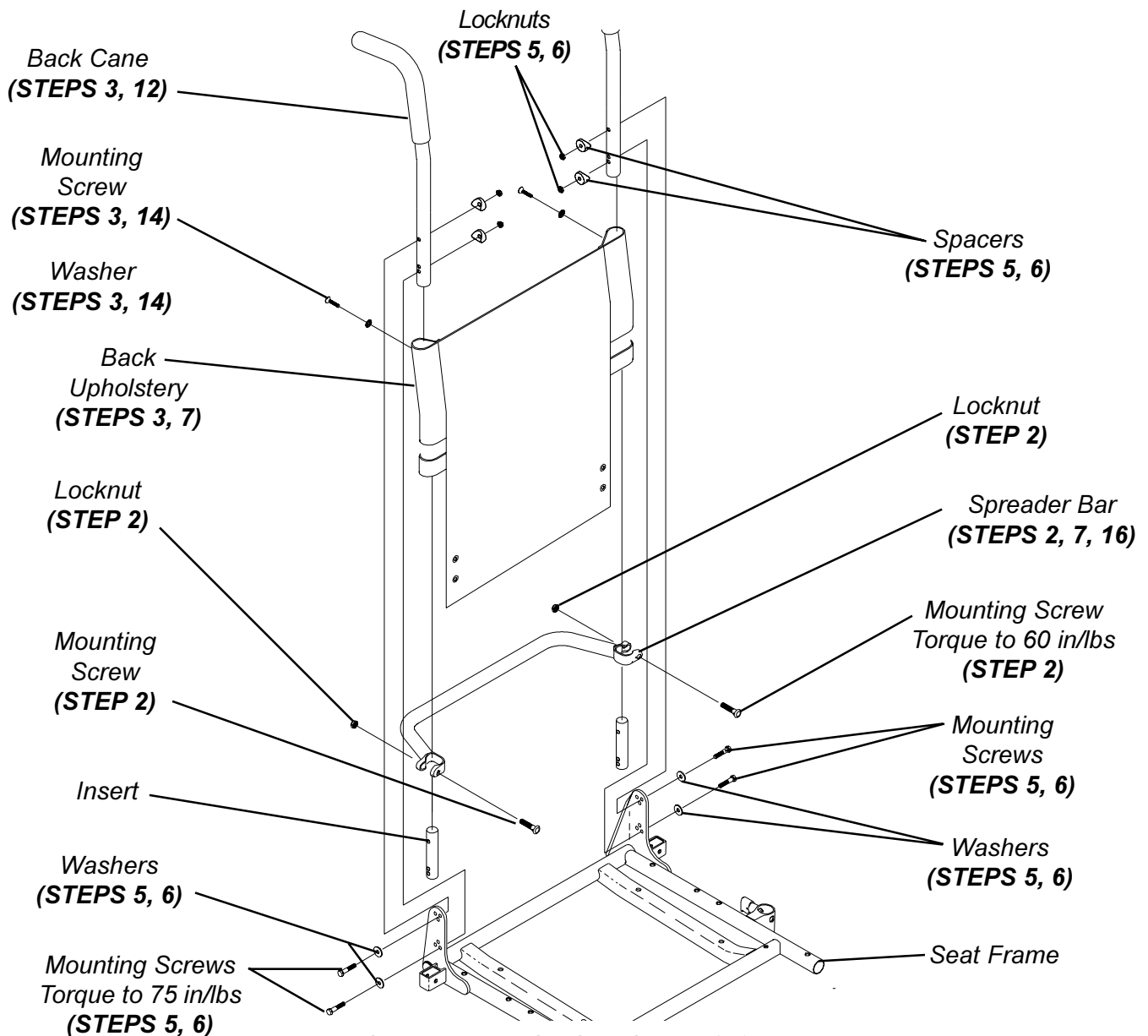


FIGURE 2 - REPLACING BACK UPHOLSTERY

<b><i>This Procedure includes the following:</i></b>	
<b><i>Preparation for Removing/Installing Seat Frame (Standard Frame, Adjustable Frame, and Captains Van Seat) .....</i></b>	<b><i>Page 21</i></b>
<b><i>Replacing Exact Same Size Standard Seat Frame .....</i></b>	<b><i>Page 22</i></b>
<b><i>Removing/Installing Standard Seat Frame Sub-Assembly .....</i></b>	<b><i>Page 22</i></b>
<b><i>Changing Seat Depth .....</i></b>	<b><i>Page 23</i></b>
<b><i>Changing Seat Width (Standard and Adjustable Seat Frame) .....</i></b>	<b><i>Page 25</i></b>
<b><i>Installing/Removing Adjustable Seat Frame Sub-Assembly and/or Component Replacement .....</i></b>	<b><i>Page 26</i></b>
<b><i>Installing/Removing Captains Van Seat Assembly .....</i></b>	<b><i>Page 28</i></b>
<b><i>Replacing Captains Van Seat and/or Captains Van Seat Frame .....</i></b>	<b><i>Page 28</i></b>
<b><i>Converting From Standard Seat Frame to Adjustable Seat Frame or Vice Versa .....</i></b>	<b><i>Page 29</i></b>
<b><i>Converting From Adjustable Seat Frame to Captains Van Seat or Vice Versa .....</i></b>	<b><i>Page 29</i></b>
<b><i>Converting From Standard Seat Frame to Captains Van Seat or Vice Versa .....</i></b>	<b><i>Page 30</i></b>
<b><i>Removing/Installing Seat Pan .....</i></b>	<b><i>Page 30</i></b>
<b><i>Mounting Plate - Seat Angle Adjustment and Installation Orientation .....</i></b>	<b><i>Page 31</i></b>

**WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

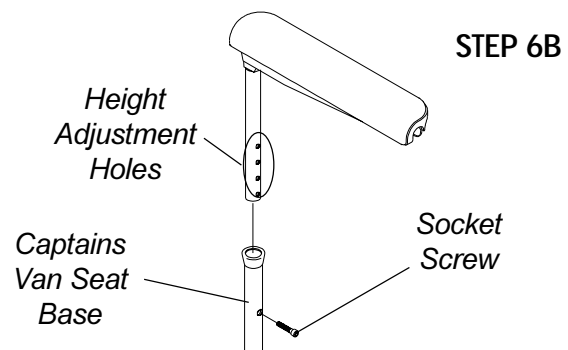
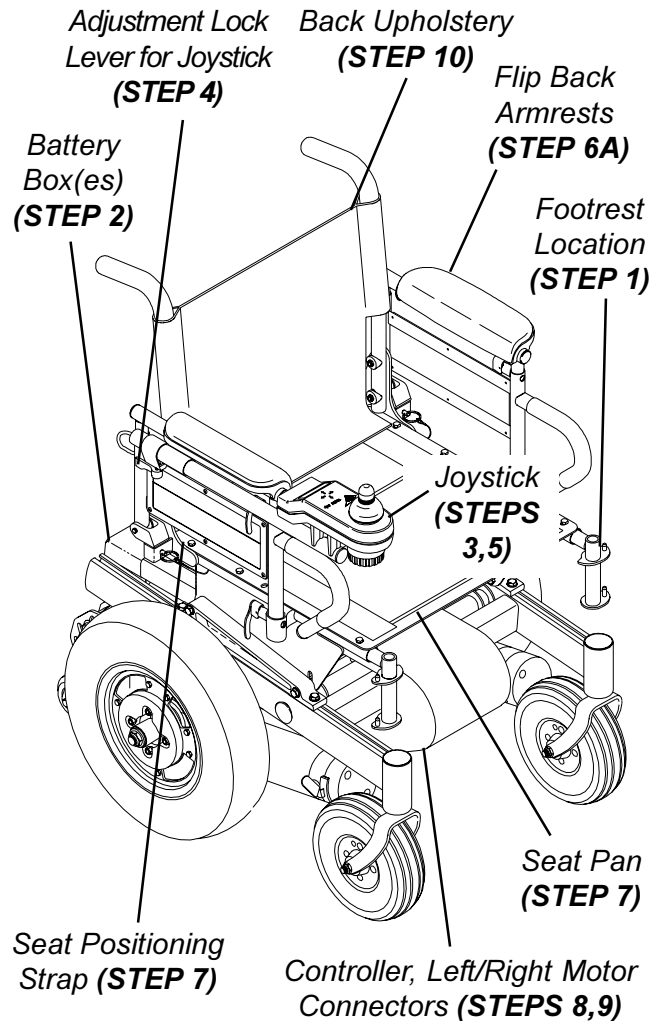
NOTE: The procedures in this section of the manual refer to NON-RECLINER seat frames only, EXCEPT Seat Angle Adjustment. For recliner seat frames, refer to PROCEDURE 14 of this manual.

**PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) (FIGURE 1)**

NOTE: When installing/replacing components of the wheelchair, refer to the individual procedure for correct use of LOCTITE 242 and torque specifications or PROCEDURE 3 of this manual.

NOTE: To reinstall these components, reverse the following steps.

1. Remove footrest assemblies. Refer to PROCEDURE 4 in of the owner's manual, 1081227.
2. Remove battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.



NOTE: Illustration depicts tubular seat frame only. Preparation steps for the captains van seat apply in the same manner.

**FIGURE 1 - PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT)**

3. Cut tie wraps and disconnect joystick from controller.
4. Turn the lever on the adjustment lock to release the adjustment lock from the joystick mounting tube.
5. Remove the joystick from the wheelchair.
6. Perform one (1) of the following:
  - A. **STANDARD OR ADJUSTABLE SEAT FRAMES** - Remove the flip-back armrests from the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.
  - B. **CAPTAINS VAN SEAT** - Remove the mounting screw that secures the armrest to the van seat frame. Repeat for opposite side.
7. For standard and adjustable seat frames, remove the seat pan (including seat positioning straps). Refer to REMOVING/INSTALLING SEAT PAN in this procedure of the manual.
8. Disconnect battery and left/right motor connectors from the controller. Refer to REPLACING WIRING HARNESS in PROCEDURE 10 of this manual.
9. Remove tie-wraps that secures the wiring harness to the seat frame and the charger cable from its mounting bracket. Refer to REPLACING WIRING HARNESS in PROCEDURE 10 of this manual.
10. For standard and adjustable seat frames, remove the back upholstery (including back canes and spreader bar, if applicable). Refer to REPLACING BACK UPHOLSTERY in PROCEDURE 5 of the manual.
11. Refer back to the starting procedure to complete the desired change.

## REPLACING EXACT SAME SIZE STANDARD SEAT FRAME

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.
2. Remove the existing standard seat frame subassembly and install the NEW standard frame. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in this procedure of the manual.
3. **FOR 12-15-INCH SEAT DEPTHS ONLY:** Remove the CJ back brackets from the existing standard seat frame and install onto the NEW standard seat frame. Refer to REMOVING/INSTALLING CJ BACK BRACKETS FROM SEAT FRAME in this procedure of the manual.

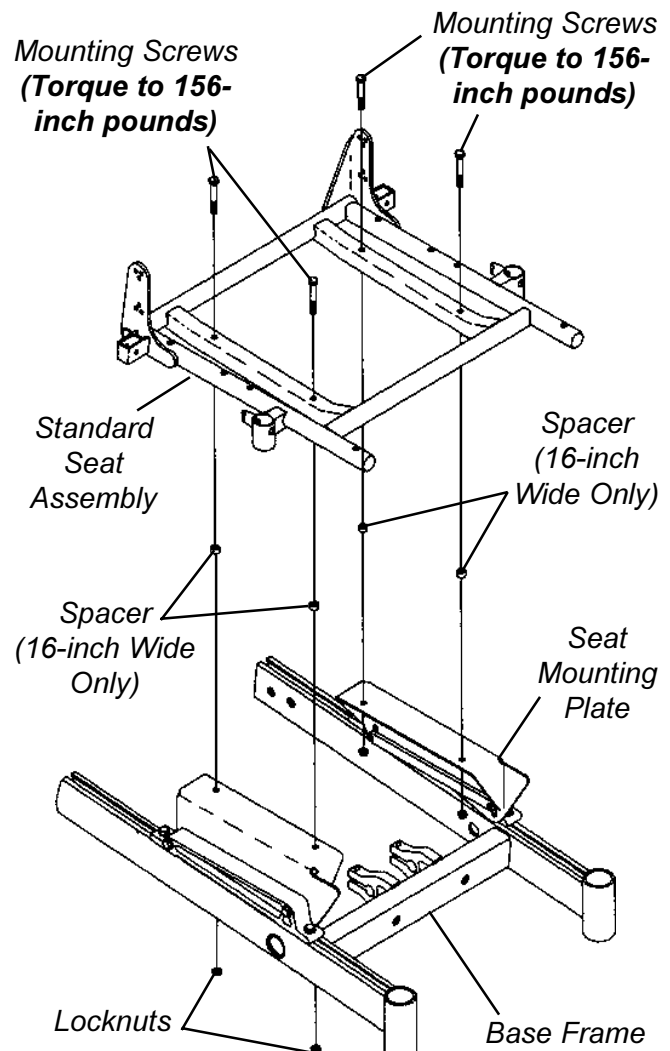
4. Reinstall the components previously removed in STEP 1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.

## REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY (FIGURE 2)

*NOTE: Perform steps required from starting procedure.*

### Removing

1. Remove the four (4) mounting screws, locknuts and spacers, if applicable, that secure the standard seat frame subassembly to the seat mounting plates.
2. Remove the existing standard seat frame.



*NOTE: For 16-inch wide seat frames, there will be spacers positioned between the seat frame and the seat mounting plates.*

FIGURE 2 - REMOVING/INSTALLING STANDARD SEAT FRAME SUB-ASSEMBLY

3. Refer back to the starting procedure to complete the desired change.

**Installing**

1. Position NEW standard seat frame subassembly on seat mount plates.
2. Secure NEW standard seat frame subassembly onto seat mounting plates with the existing four (4) mounting screws, locknuts and spacers, if applicable. Torque to 156-inch pounds.
3. Refer back to the starting procedure to complete the desired change.

**CHANGING SEAT DEPTH**

**Standard Seat Frame**

NOTE: Review the chart below. This will determine the components needed to obtain the desired seat depth.

COMPONENT IDENTIFICATION TABLE FOR STANDARD SEAT FRAME

SEAT DEPTH	SEAT FRAME COMPONENTS		
	CJ BACK BRACKETS REQUIRED	SEAT PAN	SEAT FRAME DEPTH
12-inches to 15-inches	YES	17-inch	16-inch deep
16-inches	NO	16-inch	16-inch deep
17-inches	NO	17-inch	16-inch deep
18-inches	NO	18-inch	18-inch deep
19-inches	NO	19-inch	18-inch deep
20-inches	NO	20-inch	20-inch deep
21-inches	NO	21-inch	20-inch deep
22-inches	NO	22-inch	22-inch deep

1. Find current seat depth in left hand column in the chart.
2. Follow that row to right under seat frame components.
3. Verify and note the components of the current seat depth.
4. Repeat STEPS 1-3 for your desired seat depth.
5. Compare existing components of the current seat depth and the required components for the desired seat depth.
6. Perform one (1) of the following:
  - A. If the current seat depth and the desired seat depth is within the 12-15-inch seat depth range, this change can be accomplished by repositioning the back canes on the CJ back brackets. Refer to CHANGING SEAT DEPTH BETWEEN 12-15-INCHES in this procedure of the manual.

- B. If the desired change only requires a **NEW** seat pan, refer to REMOVING/INSTALLING SEAT PAN in this procedure of the manual.

- C. For all other seat depth changes, perform the following:

- PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.

Perform one (1), two (2), or all three (3) of the procedures listed below depending on the components required for the desired seat depth determined from STEPS 1-5:

- REMOVING/INSTALLING CJ BACK BRACKETS in this procedure of the manual.
- REMOVING/INSTALLING STANDARD SEAT SUBASSEMBLY in this procedure of the manual.
- REMOVING/INSTALLING SEAT PAN in this procedure of the manual.

After completing the procedure(s) listed above, perform the steps outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) to complete the desired seat depth change.

**Adjustable Seat Frame (FIGURE 3)**

NOTE: Review the chart below. This will determine the components needed to obtain your desired seat depth.

COMPONENT IDENTIFICATION TABLE FOR STANDARD SEAT FRAME

SEAT DEPTH	SEAT FRAME COMPONENTS			
	CJ BACK BRACKETS REQUIRED	SEAT PAN	SIDE FRAME	CENTER FRAME
12-inches to 15-inches	YES	17-inch	Short	Short
16-inches	NO	16-inch	Short	Short
17-inches	NO	17-inch	Short	Short
18-inches	NO	18-inch	Medium	Short
19-inches	NO	19-inch	Medium	Short
20-inches	NO	20-inch	Long	Long
21-inches	NO	21-inch	Long	Long
22-inches	NO	22-inch	X-Long	Long

NOTE: Note the four (4) different lengths of side frames short, medium, long, and X-long, as well as the two different center frames, short and long. These components are interchanged to obtain the various different seat depths.



1. Find current seat depth in left hand column in the chart.
2. Follow that row to right under seat frame components.
3. Verify and note the components of the current seat depth.
4. Repeat STEPS 1-3 for the desired seat depth.
5. Compare existing components of the current seat depth and the required components for the desired seat depth.

**To adjust the depth of the seat on the wheelchair, use the following guidelines:**

If the current seat depth is and the desired seat depth are within the 12-15-inch seat depth range, this change can be accomplished by repositioning the back canes on the CJ back brackets. Refer to CHANGING SEAT DEPTH BETWEEN 12-15-INCHES in this procedure of the manual.

If the desired change only requires a **NEW** seat pan, refer to REMOVING/INSTALLING SEAT PAN in this procedure of the manual.

If the desired change requires the removal/installation of CJ back brackets, refer to REMOVING/INSTALLING CJ BACK BRACKETS in PROCEDURE 8 of this manual.

If the desired change requires a new side frame, and/or new center frame, perform the following steps:

- A. Perform the instructions outlined in SEAT FRAME REMOVING/INSTALLING PREPARATIONS FOR STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT in this procedure of the manual.

*NOTE: Note the mounting hole position of the side frame for proper installation of the NEW side frame.*

- B. Remove the two (2) mounting screws, coved washers, spacers, and locknuts that secure the side frame to the center frame.
- C. Remove the side frame from the center frame.
- D. Repeat STEPS A and B for opposite side frame.

If the desired seat depth requires a new center frame, determined in STEPS 1-5 perform STEPS E - G, otherwise proceed to STEP H.

- E. Remove the four (4) mounting screws that secure the EXISTING center frame to support brackets.
- F. Remove existing center frame from seat mount plates.
- G. Secure **NEW** center frame to support brackets with the existing four (4) mounting screws and locknuts. Torque to 156-inch pounds.
- H. Secure **NEW** side frame to the center frame at the position noted previously. Torque to 75-inch pounds.

*NOTE: If seat width adjustment is also desired, refer to **CHANGING SEAT WIDTH** in this procedure of the manual for mounting hole locations and allowable seat width/seat depth combinations.*

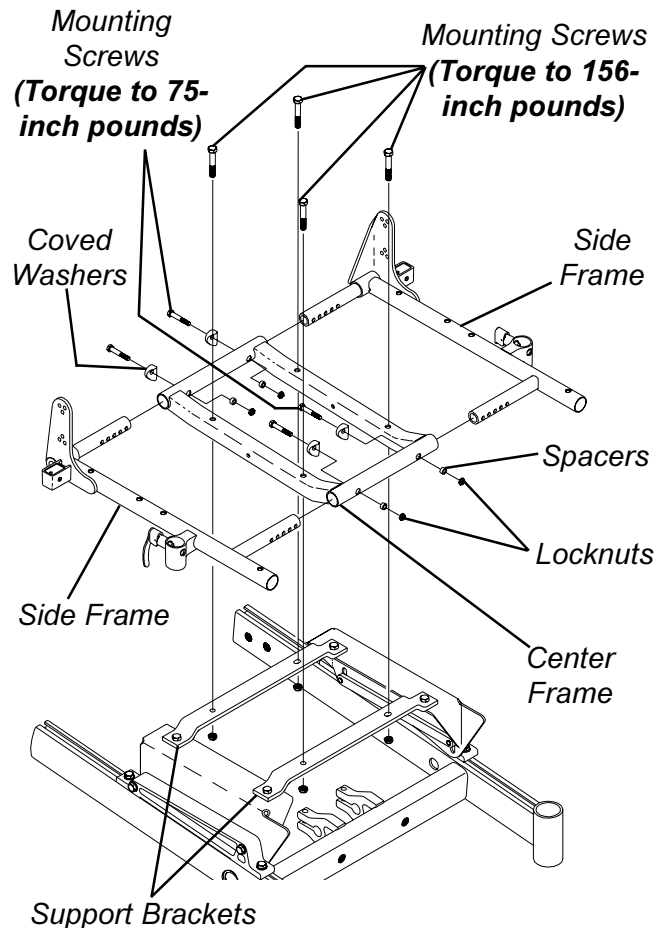


FIGURE 3- CHANGING SEAT DEPTH - ADJUSTABLE SEAT FRAME

### Changing Seat Depth Between 12 and 15-Inches (FIGURE 4)

*NOTE: There are two (2) sizes of CJ back brackets. Refer to the following chart to determine if the seat depth required is obtainable by repositioning the back canes only, or if the CJ back brackets must be replaced.*

**CJ BACK BRACKET (SEAT DEPTH) RANGES**  
**12 and 13-inches OR 14 and 15-inches**

**If seat depth required is within seat depth range of the original CJ back brackets, only the back canes need to be repositioned. Refer to the following procedure.**

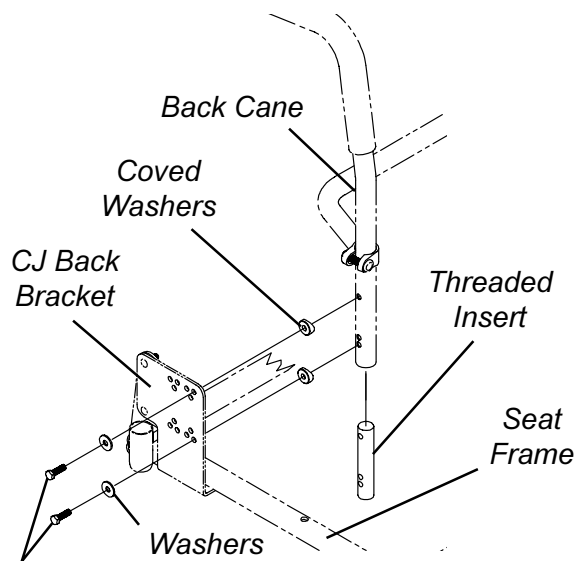
**If the seat depth required is NOT within the seat depth range of the original CJ back brackets, the CJ back brackets must be replaced before repositioning the back canes. Refer to REMOVING/INSTALLING CJ BACK BRACKETS in PROCEDURE 8 of this manual.**

1. Remove the armrests from the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.
2. Cut the tie wraps that secure the back upholstery to the CJ back brackets.
3. Pull the bottom of the back upholstery away from the rear of the seat pan.
4. Remove mounting screw, washer and covered washer from the top mounting hole of the CJ back bracket and back cane.

*NOTE: Before removing the back canes from the CJ back brackets, note the BACK ANGLE for reinstallation.*

*NOTE: To avoid losing the insert in each back cane, line up the holes in the insert with the holes in the back cane and start one of the screws through the cane from the inside of the wheelchair to hold the insert in place.*

5. Remove the mounting screw, washer and covered washer from the bottom mounting hole of the CJ back bracket and the back cane.
6. Reposition the back cane to the desired seat depth and angle. If changing the back angle as well, refer to BACK ANGLE ADJUSTMENT in PROCEDURE 8 of this manual.
7. Secure bottom of the back upholstery to the seat pan.
8. Secure the bottom of the back upholstery to the CJ back brackets with new tie wraps.
9. Use Loctite 242 and torque the mounting screws to 75-inch pounds.
10. Repeat the STEPS 1-9 for the opposite back cane.



**FIGURE 4 - ADJUSTING SEAT DEPTH - CHANGING SEAT DEPTH BETWEEN 12 AND 15-INCHES**

11. Reinstall the armrests onto the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.

## CHANGING SEAT WIDTH (STANDARD AND ADJUSTABLE SEAT FRAME)

### Standard Seat Frame

*NOTE: If changing seat width below 16-inches wide, you must convert to an adjustable seat frame. Refer to CONVERTING FROM STANDARD TO ADJUSTABLE SEAT FRAME OR VICE VERSA in this procedure of the manual. For all changes above 16-inches wide, perform the outlined steps.*

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.
2. Remove the existing standard seat frame subassembly and install the NEW standard frame. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in this procedure of the manual.
3. **FOR 12-15-INCH SEAT DEPTHS ONLY:** Remove the CJ back brackets from the existing standard seat frame and install onto the NEW standard seat frame. Refer to REMOVING/INSTALLING CJ BACK BRACKETS in PROCEDURE 8 of this manual.
4. Reinstall the components previously removed in STEP 1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.

### Adjustable Seat Frame (FIGURE 5)

*NOTE: If changing seat width above 16-inches wide, you must convert to a standard seat frame. Refer to CONVERTING FROM STANDARD TO ADJUSTABLE SEAT FRAME OR VICE VERSA in this procedure of the manual. For all changes below 16-inches wide, perform the outlined steps.*

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.
2. Review the following chart for the allowable seat width and seat depth combinations for the adjustable seat frame.

ALLOWABLE SEAT WIDTH AND DEPTH COMBINATIONS FOR ADJUSTABLE SEAT FRAME  
**SEAT WIDTH**

		12	13	14	15	16
<b>S E A T</b>	12	✓	✓	✓	✓	✓
	13	✓	✓	✓	✓	✓
	14	✓	✓	✓	✓	✓
	15	✓	✓	✓	✓	✓
	16	✓	✓	✓	✓	✓
	17	N/A	N/A	✓	✓	✓
<b>D E P T H</b>	18	N/A	N/A	✓	✓	✓
	19	N/A	N/A	✓	✓	✓
	20	N/A	N/A	✓	✓	✓
	21	N/A	N/A	✓	✓	✓
	22	N/A	N/A	✓	✓	✓

NOTE: The seat widths and seat depths enclosed in the outlined box will require the use of CJ back brackets and a 17-inch deep seat pan.

- Remove the two (2) mounting screws, covered washers, spacers, and locknuts that secure the side frame to the center frame.
- Adjust side frame to desired width determined from STEP 2. See DETAIL "A" for proper mounting hole position.
- Secure side frame to center frame with existing mounting screws, covered washers, spacers, and locknuts. Torque mounting screws to 75-inch pounds.

**WARNING**

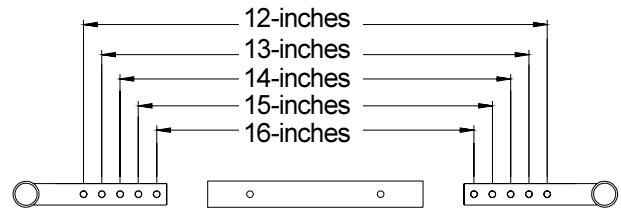
Both side frames MUST be adjusted to the same mounting hole position to maintain proper weight balance of user and seat frame. If weight is not balanced, injury to the assistant and/or user and damage to the wheelchair may result.

- Repeat STEPS 3-5 for opposite side frame.
- Perform one (1) of the following:
  - For adjusting the seat width only, perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.

NOTE: When performing the steps outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) the seat pan, seat cushion, back upholstery and spreader bar (if applicable), will need to be replaced. Spreader bars are only required on seat depths greater than 19-inches.

- For all other changes regarding seat frame changes, refer back to the starting procedure to complete the desired change.

DETAIL "A"



STEPS 3-6

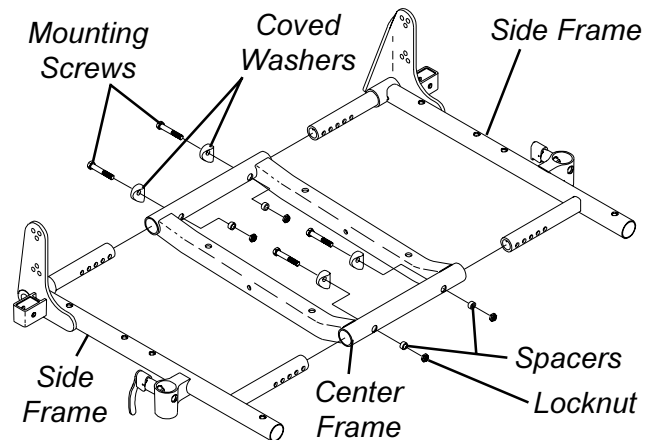


FIGURE 5 -CHANGING SEAT WIDTH - ADJUSTABLE SEAT FRAME

**INSTALLING/REMOVING ADJUSTABLE SEAT FRAME SUBASSEMBLY AND/OR COMPONENT REPLACEMENT (FIGURE 6)**

**Converting from Adjustable Seat Frame to Standard Seat Frame or Captains Van Seat**

NOTE: This section must be performed in conjunction with a starting procedure.

- Remove the four (4) mounting screws that secure the two (2) support brackets of the adjustable seat frame subassembly to the seat mounting plates.
- To complete conversion, refer back to the starting procedure to complete the desired change.

**Converting from Standard Seat Frame or Captains Van Seat To Adjustable Seat Frame**

NOTE: This section must be performed in conjunction with a starting procedure.

NOTE: When converting the seat frame, you will need a seat pan, seat cushion, back upholstery and spreader bar (if applicable). Spreader bars are only required on seat depths of greater than 19-inches.

SEAT FRAME

1. Secure both support brackets to the seat mounting plates with four (4) mounting screws and locknuts as shown in FIGURE 6. Torque mounting screws to 156-inch pounds.
2. Secure the center frame to the support brackets with four (4) mounting screws, locknuts, and spacers. Torque to 156-inch pounds.
3. Insert the side frame into the center frame and secure with mounting screw, covered spacer, spacer, and locknut. Torque to 75-inch pounds. Repeat for opposite side frame.
4. To complete conversion, refer back to the starting procedure to complete the desired change.

**Component Replacement**

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.

*NOTE: Note the mounting hole position of the current side frame(s) for proper installation of the NEW side frame(s).*

2. Remove the two (2) mounting screws, covered spacers, spacers, and locknuts that secure the side frame to the center frame.

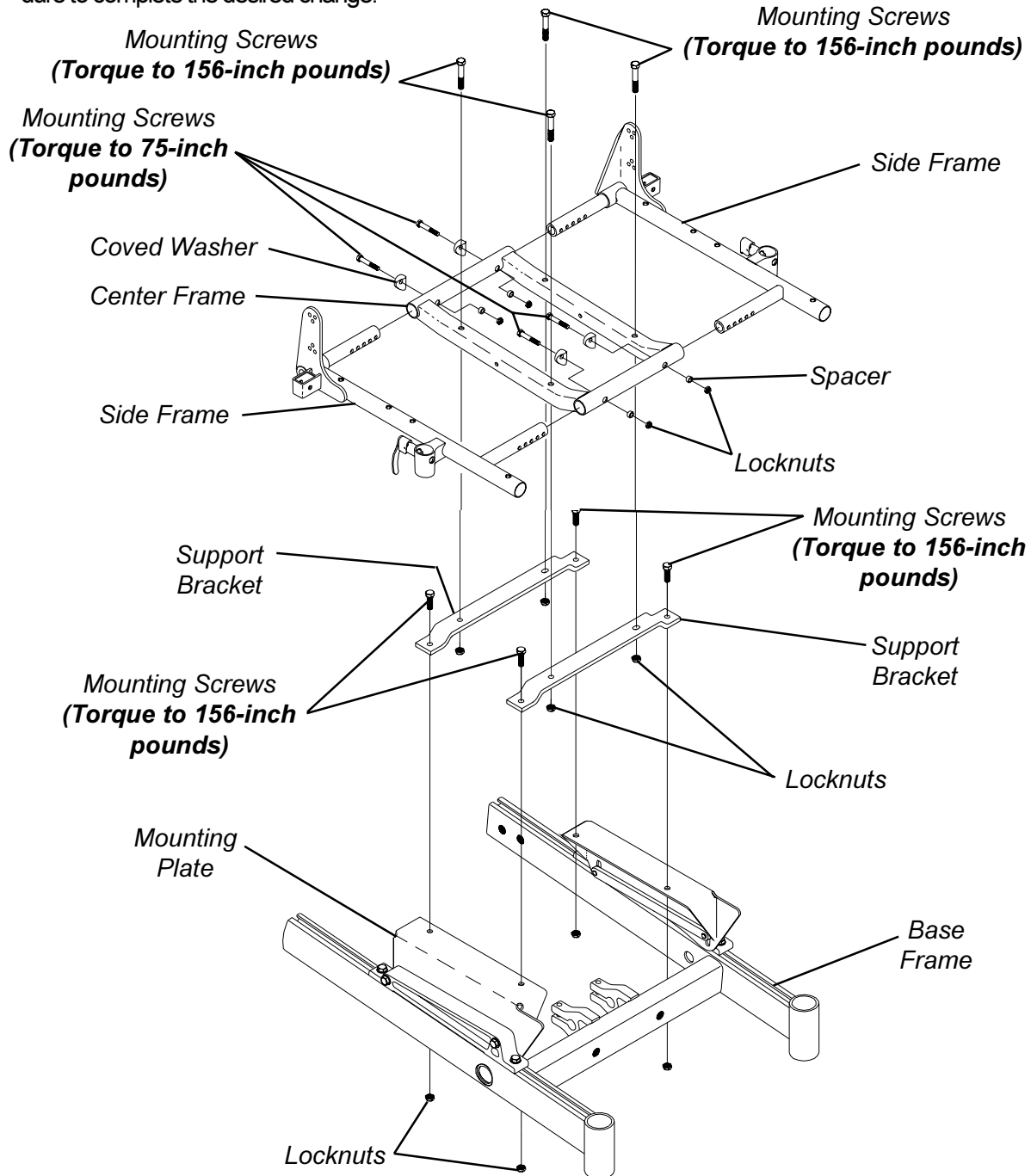


FIGURE 6 - INSTALLING/REMOVING ADJUSTABLE SEAT FRAME SUBASSEMBLY AND/OR COMPONENT REPLACEMENT

3. Perform one (1) of the following:
  - A. If center frame needs replaced, repeat STEP 2 for opposite side frame and proceed to STEP 4.
  - B. If opposite side frame needs replaced, repeat STEP 2, then proceed to STEP 6. Otherwise proceed to STEP 6.
4. Remove the four (4) mounting screws and locknuts that secure the center frame to the support brackets.
5. Secure NEW center frame to support brackets with existing four (4) mounting screws and locknuts. Torque to 156-inch pounds.

**WARNING**

Both side frames **MUST** be adjusted to the same mounting hole position to maintain proper weight balance of user and seat frame. If weight is not balanced, injury to the assistant and/or user and damage to the wheelchair may result.

6. Install new/existing side frame(s) into new/existing center frame at the mounting position previously noted. Torque to 75-inch pounds.
7. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.

### INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY (FIGURE 7)

*NOTE: This procedure is to be performed in conjunction with a starting procedure. Proceed to the section that reflects the desired change.*

#### Installing Captains Van Seat

1. Position the captains van seat on the seat mounting plates at the position shown in FIGURE 7.
2. Line up mounting holes in the captains van seat frame and the mounting holes in the seat mounting plates.
3. Secure the captains van seat to the seat mounting plates with four (4) mounting screws, and locknuts. Torque to 156-inch pounds.
4. Refer back to the starting procedure to complete the desired change.

#### Removing Captains Van Seat

1. Remove the four (4) mounting screws and locknuts that secure the captains van seat to the seat mounting plates.
2. Remove captains van seat from seat mounting plates.
3. Refer back to the starting procedure to complete the desired change.

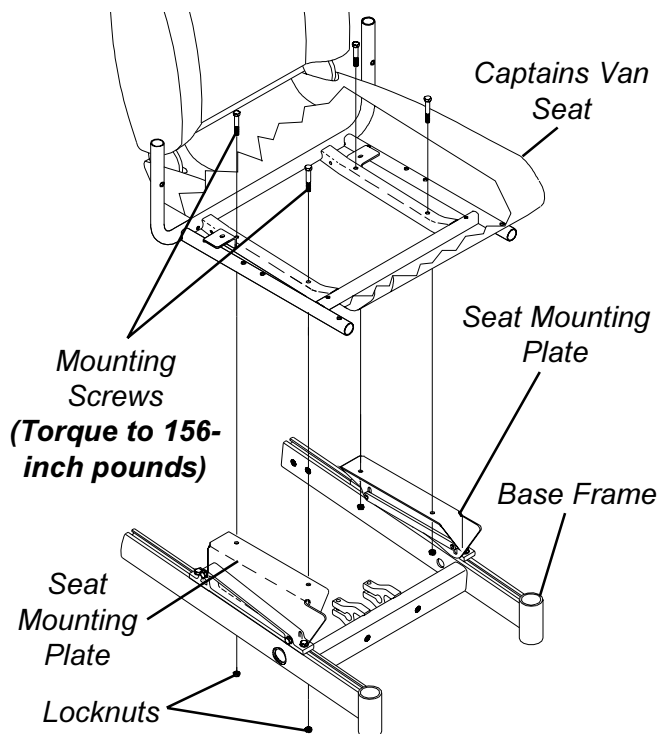


FIGURE 7 - REMOVING/INSTALLING CAPTAINS VAN SEAT ASSEMBLY

### REPLACING CAPTAINS VAN SEAT AND/OR CAPTAINS VAN SEAT FRAME (FIGURE 8)

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.
2. Remove the captains van seat assembly from the wheelchair. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in this procedure of the manual.

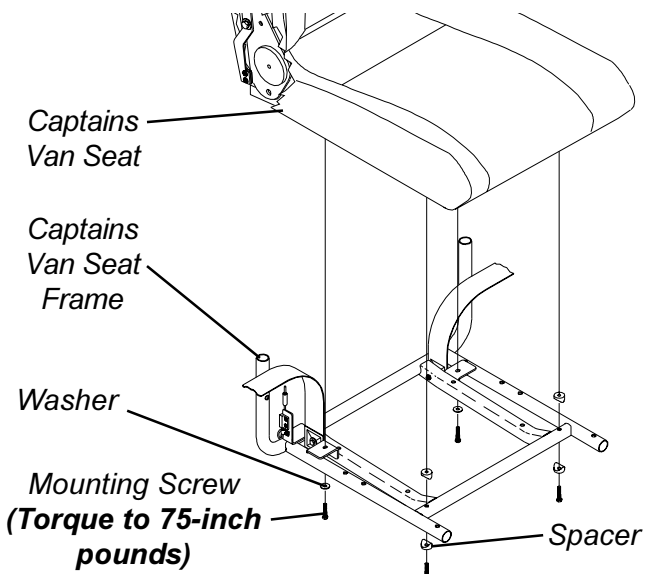


FIGURE 8 - REPLACING CAPTAINS VAN SEAT AND/OR CAPTAINS VAN SEAT FRAME

3. Remove the four (4) mounting screws, two (2) washers, and two (2) spacers that secure the captains van seat to the seat frame.
4. Replace the captains van seat or the seat frame.
5. Secure new/existing captains van seat to the new/existing captains van seat frame with existing four (4) mounting screws and spacers. Torque to 75- inch pounds.
6. Install new captains van seat assembly onto the wheelchair. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in this procedure of the manual.
7. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.
6. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.

### CONVERTING FROM STANDARD SEAT FRAME TO ADJUSTABLE SEAT FRAME OR VICE VERSA

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.
2. Perform one (1) of the following:
  - A. Remove the existing standard seat frame subassembly. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in this procedure of the manual.
  - B. Remove the adjustable seat frame subassembly. Refer to REMOVING/INSTALLING ADJUSTABLE SEAT FRAME SUBASSEMBLY AND/OR COMPONENT REPLACEMENT in this procedure of the manual.
3. Perform one (1) of the following:
  - A. Install the standard frame subassembly. Refer to INSTALLING/REMOVING STANDARD SEAT FRAME SUBASSEMBLY in this procedure of the manual.
  - B. Install the adjustable seat frame subassembly. Refer to INSTALLING/REMOVING ADJUSTABLE SEAT FRAME SUBASSEMBLY AND/OR COMPONENT REPLACEMENT in this procedure of the manual.
4. **ADJUSTABLE FRAMES ONLY:** Adjust side frame to desired seat width. Refer to CHANGING SEAT WIDTH in this procedure of the manual for mounting hole locations and allowable seat width/seat depth combinations.
5. **STANDARD AND ADJUSTABLE FRAME WITH 12-15-INCH SEAT DEPTHS ONLY:** Remove the CJ back brackets from the existing standard seat frame and install onto the **NEW** standard seat frame. Refer to REMOVING/INSTALLING CJ BACK BRACKETS in PROCEDURE 8 of this manual.

### CONVERTING FROM ADJUSTABLE SEAT FRAME TO CAPTAINS VAN SEAT OR VICE VERSA

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.
2. Perform one (1) of the following:
  - A. Remove the adjustable seat frame subassembly. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in this procedure of the manual.
  - B. Remove the captains van seat Assembly. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in this procedure of the manual.
3. Perform one (1) of the following sections:

#### Adjustable Frames

- A. Install the adjustable seat frame subassembly. Refer to INSTALLING/REMOVING ADJUSTABLE SEAT FRAME SUBASSEMBLY AND/OR COMPONENT REPLACEMENT in this procedure of the manual.
- B. Adjust side frames to desired seat width. Refer to CHANGING SEAT WIDTH in this procedure of the manual for mounting hole locations and allowable seat width/seat depth combinations.
- C. **12-15-INCH SEAT DEPTHS ONLY:** Install the CJ back brackets, seat positioning strap, and quick release pin from the onto the adjustable seat frame. Refer to REMOVING/INSTALLING CJ BACK BRACKETS in PROCEDURE 8 of this manual.
- D. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.

#### Captains Van Seat

- A. Install the captains van seat. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in this procedure of the manual.
- B. Adjust the captains van seat to the desired position. Refer to ADJUSTING CAPTAINS VAN SEAT in this procedure of the manual.

- C. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.

## CONVERTING FROM STANDARD SEAT FRAME TO CAPTAINS VAN SEAT OR VICE VERSA

- Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.
- Perform one (1) of the following:
  - Remove the standard seat frame subassembly. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in this procedure of the manual.
  - Remove the captains van seat Assembly. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in this procedure of the manual.
- Perform one (1) of the following:
  - Install the captains van seat. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in this procedure of the manual.
  - Install the standard seat frame. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in this procedure of the manual.
- STANDARD FRAMES ONLY ON 12-15-INCH SEAT DEPTHS ONLY:** Install the CJ back brackets from the onto the adjustable seat frame. Refer to REMOVING/INSTALLING CJ BACK BRACKETS in PROCEDURE 8 of this manual.
- Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in this procedure of the manual.
- Adjust the captains van seat to the desired position. Refer to ADJUSTING CAPTAINS VAN SEAT in this procedure of the manual.

## REMOVING/INSTALLING SEAT PAN (FIGURE 9)

### Removing

- Remove the seat cushion from the seat pan.
- Remove the flip-back armrests from the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.

- Remove the six (6) mounting screws, locknuts, and spacers that secure the seat pan, seat positioning strap, and quick release pin to the seat frame.

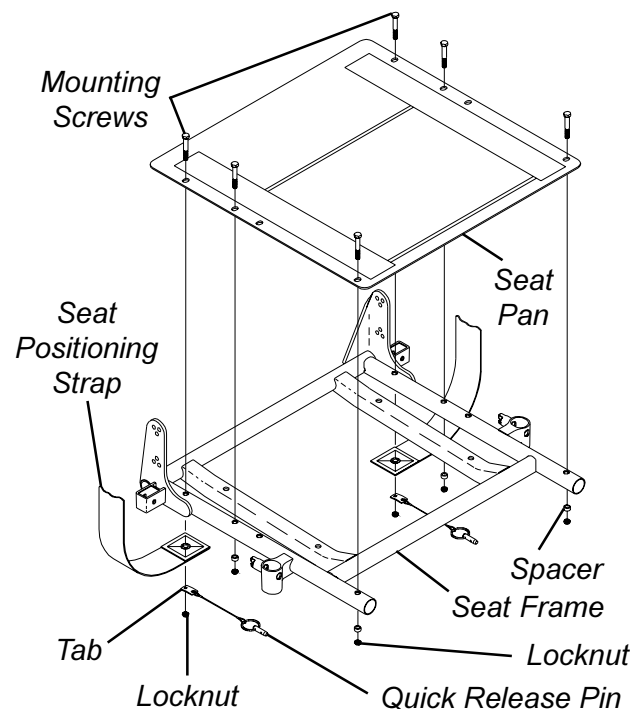
*NOTE: When removing seat pan, note tab position of quick release pin to the seat positioning strap.*

### Installing

- Position the NEW seat pan on the seat frame, aligning the mounting holes of the seat pan and the mounting holes of the seat frame.
- Position the seat positioning strap and quick release pin tab onto the seat frame and secure with mounting screw and locknut. See FIGURE 9 for proper orientation. Repeat for other seat positioning strap.

*NOTE: Check seat positioning strap for proper length. The width range for the four (4) seat positioning straps are: 12-16-inches wide (Junior), 16-19-inches wide, 20-22-inches wide, and 23-24-inches wide.*

- Reinstall the remaining mounting screws, locknuts, and spacers. Torque all mounting screws to 75-inch pounds.
- Remove the protective strips from new seat pan and reinstall the seat cushion onto the seat pan.
- Perform one (1) of the following:
  - When changing the seat width or depth, refer back to that procedure to complete the desired change.



*NOTE: Illustration shows standard frame only for clarity. The seat pan removes/installs onto the adjustable seat frame the way.*

FIGURE 9 - REMOVING/INSTALLING SEAT PAN

SEAT FRAME

- B. Reinstall the flip-back armrests from the wheelchair. Refer to INSTALLING/REMOVING FLIPBACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.

**MOUNTING PLATE - SEAT ANGLE ADJUSTMENT AND INSTALLATION ORIENTATION (FIGURE 10)**

**Seat Angle Adjustment**

*NOTE: The angle of the seat is factory set providing the user with a 5° seat dump. This angle can be changed by adjusting either the front or back of the seat mount plate to obtain any angle between 0° or 10° seat dump.*

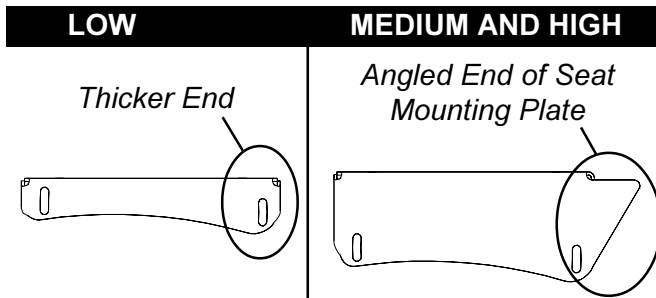
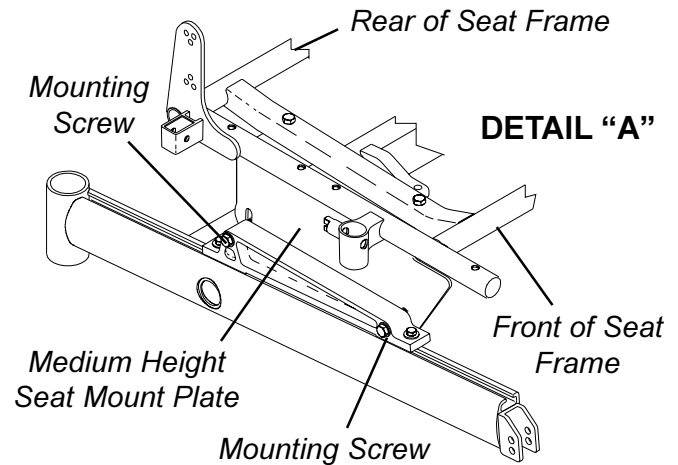
*NOTE: There are three (3) heights of seat mounting plates; low, medium, and high. See chart below for proper settings.*

1. To obtain a 0° seat dump (DETAIL "A"):
  - A. Loosen the two (2) mounting screws that secure the rear of the seat frame to the seat mount plate.
  - B. Position the mounting screws at the bottom of the rear slot.

- C. Securely tighten both mounting screws. Torque to 15-in/lbs.
2. To obtain a 10° seat dump (DETAIL "A"):
    - A. Loosen the two (2) mounting screws that secure the front of the seat frame to the seat mount plate.
    - B. Position the mounting screws at the bottom of the front slot.
    - C. Securely tighten both mounting screws. Torque to 15-in/lbs.

**Installation Orientation**

1. **Medium and High Seat Mounting Plates:** Install with the angled end toward the front of the wheelchair.
2. **Low Seat Mounting Plates:** Install with the thicker end toward the front of the wheelchair.



**SEAT MOUNT PLATE**

**SEAT DUMP**

	SEAT DUMP					
	0°		5°		10°	
	REAR OF CHAIR	FRONT OF CHAIR	REAR OF CHAIR	FRONT OF CHAIR	REAR OF CHAIR	FRONT OF CHAIR
LOW HEIGHT						
MEDIUM HEIGHT						
HIGH HEIGHT						

FIGURE 10 - MOUNTING PLATE - SEAT ANGLE ADJUSTMENT AND INSTALLATION ORIENTATION



***This Procedure Includes the Following:***  
***Replacing Seat Mounting Plates***  
***Replacing Seat Support Brackets***  
***Replacing Seat Support Bracket T-Nuts***  
***Replacing Battery Charger Bracket and T-Nut***  
***Removing/Installing Seat Stop Screws***

**WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

**REPLACING SEAT MOUNTING PLATES (FIGURE 1)**

*NOTE: When replacing components of the wheelchair, refer to the individual procedure for correct use of LOCTITE 242 and torque specifications or PROCEDURE 3 of this Manual.*

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
2. Perform one (1) of the following:
  - A. Remove standard seat frame subassembly. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in PROCEDURE 6 of this manual.
  - B. Remove adjustable seat frame subassembly. Refer to INSTALLING/REMOVING ADJUSTABLE SEAT FRAME ASSEMBLY AND OR COMPONENT REPLACEMENT in PROCEDURE 6 of this manual.
  - C. Remove captains van seat. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in PROCEDURE 6 of this manual.

*NOTE: Before removing seat mounting plates, note the position of the washers.*

3. Remove the two (2) mounting screws, washers and bolt strap bracket that secure the seat mounting plate to the seat support bracket.
4. Secure NEW seat mounting plate with existing two (2) mounting screws, washers, and bolt straps to seat support bracket using Loctite 242 and torque to 156-inch pounds.
5. Repeat STEPS 1-2 for opposite side, if necessary.

*NOTE: For illustrations of the three (3) different seat mounting plates, refer to MOUNTING PLATE - SEAT ANGLE ADJUSTMENT AND INSTALLATION ORIENTATION in PROCEDURE 6 of this manual.*

6. Adjust seat mounting plates to desired angle. Refer to MOUNTING PLATE - SEAT ANGLE ADJUSTMENT AND INSTALLATION ORIENTATION in PROCEDURE 6 of this manual.
7. Reverse STEP 2A, 2B or 2C.
8. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.

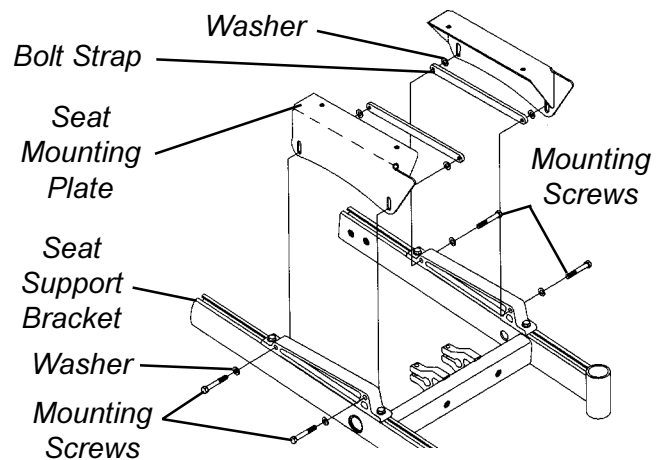


FIGURE 1 - REPLACING SEAT MOUNTING PLATES

**REPLACING SEAT SUPPORT BRACKETS (FIGURE 2)**

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
2. Perform one (1) of the following:
  - A. Remove standard seat frame subassembly. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in PROCEDURE 6 of this manual.
  - B. Remove adjustable seat frame subassembly. Refer to INSTALLING/REMOVING ADJUSTABLE SEAT FRAME ASSEMBLY AND OR COMPONENT REPLACEMENT in PROCEDURE 6 of this manual.
  - C. Remove captains van seat. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in PROCEDURE 6 of this manual.
3. Remove seat mount plates. Refer to REPLACING SEAT MOUNTING PLATES in this procedure of the manual.

*NOTE: Note the position of the seat support brackets before removing to ensure proper reinstallation.*

**WARNING**

Do not adjust the position of the seat support bracket in this procedure. If an adjustment is desired, refer to ADJUSTING WEIGHT DISTRIBUTION in PROCEDURE 15 - MWD WHEELCHAIRS, PROCEDURE 16 - RWD WHEELCHAIRS, or PROCEDURE 17 - FWD WHEELCHAIRS of this manual.

- Remove the two (2) mounting screws and washers that secure the seat support bracket to the base frame.

**WARNING**

When installing seat support bracket, ensure the mounting screws are threaded into the T-Nuts located inside the channel of the base frame.

- Secure the NEW seat support bracket to base frame with the existing two (2) mounting screws and washers. Torque to 156-inch pounds.
- Reinstall seat mount plates. Refer to REPLACING SEAT MOUNTING PLATES in this procedure of the manual.
- Adjust seat mount plates to desired angle. Refer to MOUNTING PLATE - SEAT ANGLE ADJUSTMENT AND INSTALLATION ORIENTATION in PROCEDURE 6 of this manual.
- Reverse STEP 2A, 2B or 2C.
- Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.

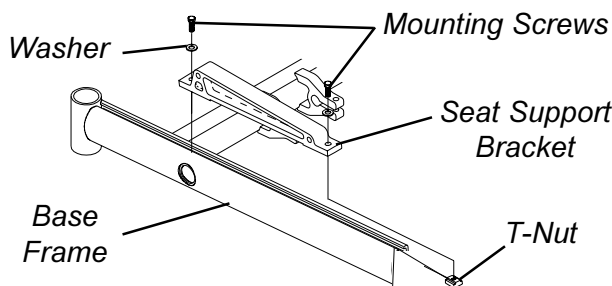


FIGURE 2 - REPLACING SEAT SUPPORT BRACKETS

**REPLACING SEAT SUPPORT BRACKET T-NUTS (FIGURE 3)**

- Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
- Perform one (1) of the following:
  - Remove standard seat frame subassembly. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in PROCEDURE 6 of this manual.

- Remove adjustable seat frame subassembly. Refer to INSTALLING/REMOVING ADJUSTABLE SEAT FRAME ASSEMBLY AND OR COMPONENT REPLACEMENT in PROCEDURE 6 of this manual.
- Remove captains van seat. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in PROCEDURE 6 of this manual.

- Remove the seat mount plates. Refer to REPLACING SEAT MOUNTING PLATES in this procedure of the manual.

*NOTE: Before removing seat mounting plates, note the position of the washers.*

- Remove the seat support brackets. Refer to REPLACING SEAT SUPPORT BRACKETS in this procedure of the manual.
- Remove the seat stop screw that is closest to the end cap. Refer to REMOVING/INSTALLING SEAT STOP SCREWS in this procedure of the manual.
- Remove the end cap and channel cover.
- Slide existing T-Nut(s) out of channel.
- Insert NEW T-Nut(s) into channel in correct orientation.
- Replace channel cover and end cap.

**WARNING**

The seat stop screws must be in place before operation of your power wheelchair. Ensure the T-Nut(s) are positioned between both seat stop screws.

- Use Loctite 242 and reinstall seat stop screw into base frame.
- Reinstall the seat support brackets. Refer to REPLACING SEAT SUPPORT BRACKETS in this procedure of the manual.

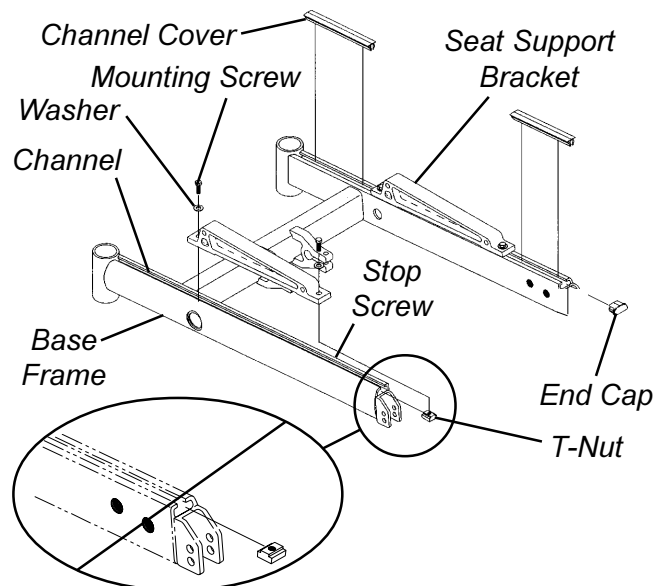


FIGURE 3 - REPLACING SEAT SUPPORT BRACKET T-NUTS

12. Reinstall the seat mount plates. Refer to REPLACING SEAT MOUNTING PLATES in this procedure of the manual.
13. Adjust seat mounting plates to desired angle. Refer to MOUNTING PLATE - SEAT ANGLE ADJUSTMENT AND INSTALLATION ORIENTATION in PROCEDURE 6 of this manual.
14. Reverse STEP 2A, 2B or 2C.
15. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
8. Secure the battery charger connector to the mount bracket with the EXISTING two (2) mounting screws. Tighten securely.
9. Reverse STEP 2A, 2B or 2C.
10. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.

## REPLACING BATTERY CHARGER BRACKET AND T-NUT

NOTE: There is no T-nut on the FWD models.

### RWD and MWD Models (FIGURE 4)

1. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING THE SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
2. Perform one (1) of the following:
  - A. Remove standard seat frame subassembly. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in PROCEDURE 6 of this manual.
  - B. Remove adjustable seat frame subassembly. Refer to INSTALLING/REMOVING ADJUSTABLE SEAT FRAME ASSEMBLY AND OR COMPONENT REPLACEMENT in PROCEDURE 6 of this manual.
  - C. Remove captains van seat. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in PROCEDURE 6 of this manual.
3. Remove the seat support brackets. Refer to REPLACING SEAT SUPPORT BRACKETS in this procedure of this manual.
4. Remove the two (2) mounting screws that secure the battery charger connector to the mount bracket.
5. Remove battery charger connector from mount bracket.
6. Remove the mounting screw which secures the battery charger mount bracket to the T-nut located in the channel of the base frame.
7. Replace battery charger mount bracket and secure to base frame with existing mounting screw.

NOTE: To replace the Battery Charger Bracket T-Nut, perform STEPS 3-13 in REPLACING SEAT SUPPORT BRACKET T-NUTS in this procedure of the manual.

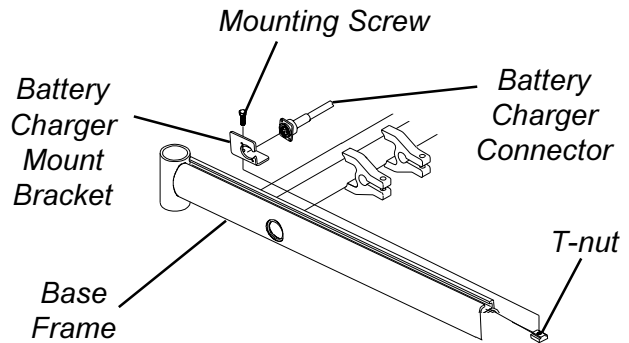


FIGURE 4 - RWD AND MWD MODELS

### Arrow FWD Model (FIGURE 5)

1. Perform one (1) of the following:
  - A. For **LOW MOUNT BRACKETS**, perform STEPS 1-11.
  - B. For **MEDIUM/HIGH MOUNT BRACKETS** perform STEPS 4-9 ONLY.
2. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING THE SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
3. Perform one (1) of the following:
  - A. Remove standard seat frame subassembly. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY in PROCEDURE 6 of this manual.
  - B. Remove adjustable seat frame subassembly. Refer to INSTALLING/REMOVING ADJUSTABLE SEAT FRAME ASSEMBLY AND OR COMPONENT REPLACEMENT in PROCEDURE 6 of this manual.
  - C. Remove captains van seat. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY in PROCEDURE 6 of this manual.
4. Remove the front shroud. Refer to REMOVING/INSTALLING FRONT SHROUD in PROCEDURE 17 of the manual.

5. Remove the two (2) mounting screws that secure the battery charger connector to the mount bracket.
6. Remove battery charger connector from mount bracket.
7. Remove the mounting screw which secures the battery charger mount bracket to the base frame.
8. Replace the battery charger mount bracket and secure it to the base frame with the EXISTING mounting screw. Securely tighten.
9. Secure the battery charger connector to the mount bracket with the EXISTING two (2) mounting screws. Tighten securely.
10. Reverse STEP 3A, 3B or 3C.
11. Perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.

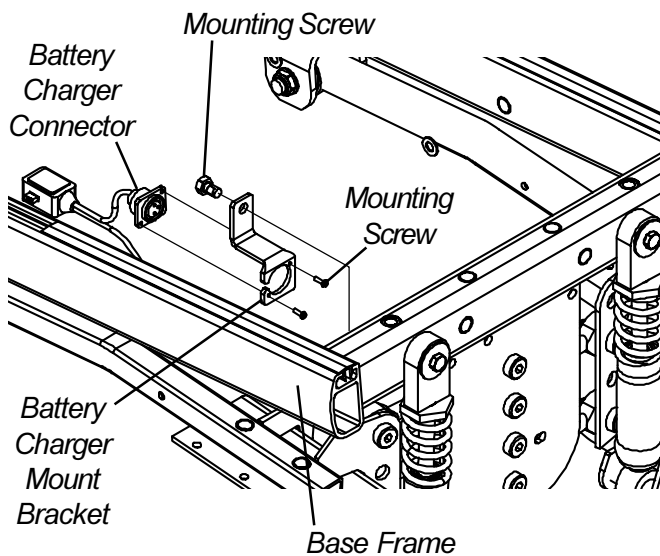


FIGURE 5 - ARROW FWD MODEL

**REMOVING/INSTALLING SEAT STOP SCREWS (FIGURE 6)**

*NOTE: This procedure is for RWD and MWD wheelchairs ONLY.*

*NOTE: The front seat stop screw should only be removed if replacing a T-nut for either the seat support bracket or the battery charger mount bracket. The rear seat stop screw should never be removed.*

1. Unthread seat stop screw from base frame.

**WARNING**

The seat stop screws must be in place before operation of your power wheelchair. Ensure the seat support bracket is positioned between both seat stop screws.

2. When reinstalling the front seat stop screw, ensure the seat support bracket is located in-between both seat stop screws. Use loctite 242 and tighten securely.

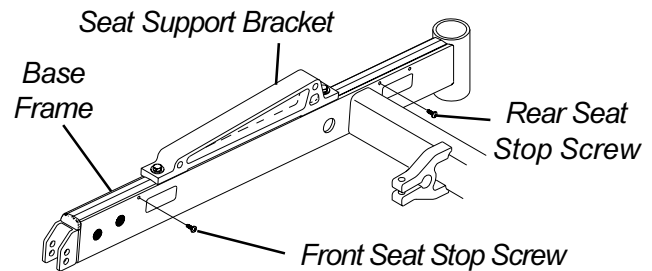


FIGURE 6 - REMOVING/INSTALLING SEAT STOP SCREWS

**This Procedure includes the following:**  
**Removing/Installing CJ Back Brackets**  
**Changing Back Height**  
**Back Angle Adjustment**

**WARNING**  
 After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

*NOTE: The procedures in this section of the manual refer to NON-RECLINER seat frames only. For recliner seat frames, refer to **PROCEDURE 14** of this manual.*

**REMOVING/INSTALLING CJ BACK BRACKETS (FIGURE 1)**

*NOTE: The following procedure is for Jr. wheelchairs only.*  
*NOTE: This procedure is to be performed in conjunction with a starting procedure except when replacement of CJ back brackets is desired.*

**Removing CJ Back Brackets**

1. If necessary, perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
2. Remove the locknuts and washers that secure the CJ back bracket to the back angle plate.
3. Remove the mounting screw and locknut that secures the quick release pin and CJ back bracket and seat positioning strap to the seat frame.
4. Remove the existing CJ back bracket.
5. Repeat STEPS 2-4 for the opposite CJ back bracket.
6. Perform one (1) of the following:
  - A. For replacement of CJ back brackets, proceed to REMOVING/INSTALLING CJ BACK BRACKETS in this procedure of the manual.
  - B. For all other seat frame changes, refer back to the starting procedure to complete the desired change.

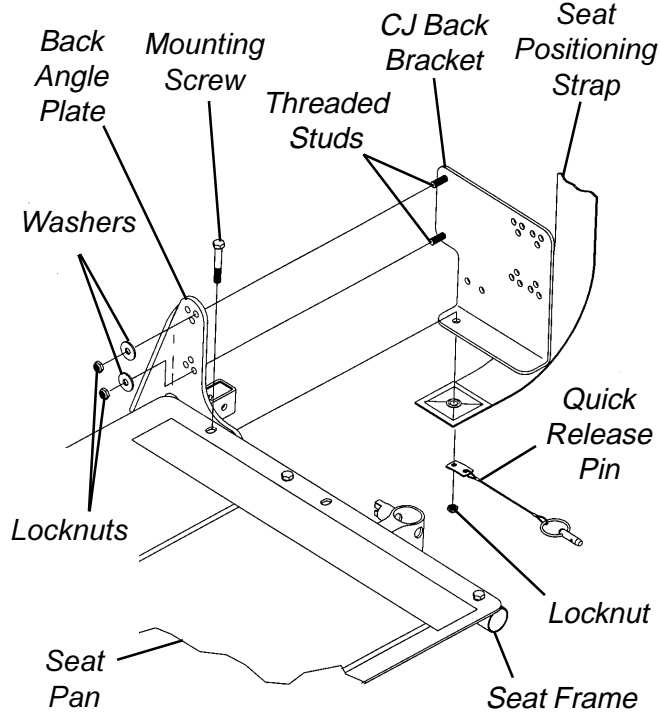
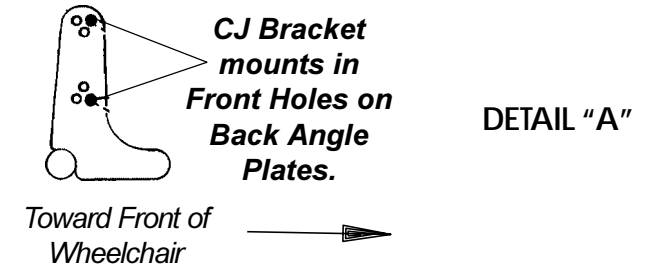
**Installing CJ Back Brackets**

1. If necessary, perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
2. Install the threaded studs of the CJ back bracket through the back angle plates as shown in FIGURE 1.

*NOTE: Ensure the CJ back bracket is mounted in the front holes of the back angle plates as shown in DETAIL "A".*

**WARNING**  
 Always wear your seat positioning strap.

3. Position the seat positioning strap and quick release pin under the CJ back bracket.
4. Secure the quick release pin, seat positioning strap, and CJ back bracket to the seat frame. Torque to 75-inch pounds.
5. Install washers and locknuts onto the threaded studs of the CJ back bracket. Torque to 75-inch pounds.
6. Perform one (1) of the following:
  - A. For replacing CJ back brackets only, perform the instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
  - B. For all other seat frame changes, refer back to the starting procedure to complete the desired change.



**FIGURE 1 - REMOVING/INSTALLING CJ BACK BRACKETS**

## CHANGING BACK HEIGHT (FIGURE 2)

*NOTE: If changing the back height, new back upholstery may be needed as well. Refer to the following chart to determine if new back upholstery is needed:*

### BACK UPHOLSTERY HEIGHT RANGES

- 16-17-INCHES
- 18-19-INCHES
- 20-INCHES
- 21-22-INCHES
- 23-24-INCHES

**If back height required is within the range of the original back height, only new back canes will be needed.**

**If the back height required is NOT within the range of the original back height, new back upholstery, as well as new back canes will be needed.**

*NOTE: Existing hardware and inserts will be reused.*

1. Remove the armrests from the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.

*NOTE: Note the correct mounting screw mounting positions to ensure the proper back angle for reinstallation.*

2. Remove the two (2) mounting screws and washers that secure the existing back upholstery to the back canes.
3. Remove the four (4) mounting screws, washers, spacers, and locknuts that secure the existing back canes to the seat frame.
4. Remove the inserts from the existing back canes.
5. Remove the back assembly from the wheelchair.
6. If applicable, loosen, but do not remove the mounting screws and locknuts that secure the spreader bar to the existing back canes.
7. Remove existing back canes from the back assembly.
8. Slide the inserts into the bottom of the **NEW** back canes.
9. Line up the mounting holes of the inserts with the mounting holes in the back canes.

*NOTE: To keep the inserts lined up for reinstallation onto the wheelchair, start one (1) of the mounting screws through the back cane from inside of the wheelchair to hold the insert in place.*

10. Slide the **NEW** back canes through the existing/**NEW** back upholstery and spreader bar.
11. If applicable, loosely tighten the mounting screws that secure the spreader bar to the **NEW** back canes.
12. Line up the mounting holes in the back canes with the mounting holes in the seat frame.

*NOTE: If needing a reference for proper mounting holes for the back angle required, or if changing the original back angle, refer to BACK ANGLE ADJUSTMENT in this procedure of the manual.*

### WARNING

The back canes **MUST** be fastened securely to the seat frame **BEFORE** using the wheelchair. Torque to 75-inch pounds.

13. Secure the two (2) **NEW** back canes to the seat frame with the existing four (4) mounting screws, washers, spacers, and locknuts. Use Loctite 242 and torque to 75-inch pounds.
14. Secure the top of the existing/new back upholstery to the back canes with the two (2) existing mounting screws and washers.
15. Secure bottom of the existing/**NEW** back upholstery to rear of the seat pan.
16. Secure the bottom of the existing/**NEW** back upholstery to the back canes with new tie-wraps.

*NOTE: Clean upholstery with warm DAMP cloth and mild detergent to remove superficial soil.*

### WARNING

Laundering or moisture will reduce flame retardancy of the upholstery.

*NOTE: When replacing the back upholstery, back assembly or changing back height, follow these guidelines for spreader bar height (where applicable):*

BACK HEIGHT	◆ SPREADER BAR HEIGHT
16-inches*	5-inches
17-inches*	5-inches
18-19-inches*	7-inches
20-24inches	7-inches

*NOTE: Spreader Bar required on back heights 20-24-inches. \*Spreader bar ONLY required on these back heights if the width or depth of the chair exceeds 19-inches.*

### ◆ Height of Spreader Bar from Bottom of Back Canes to Top of Spreader Bar Clamp.

#### HEAVY DUTY MODELS

*NOTE: Spreader bar required on all Heavy Duty models.*

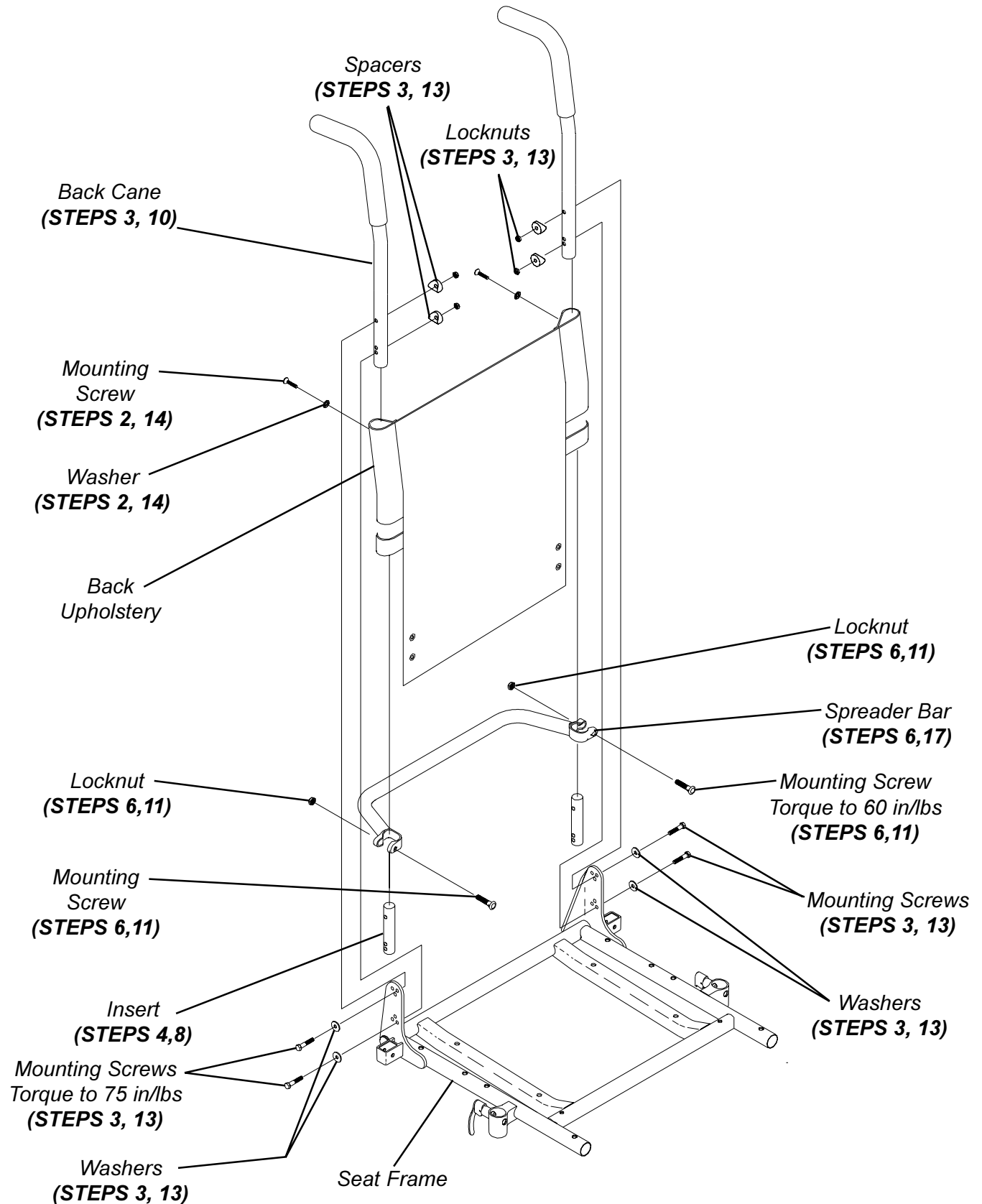
BACK HEIGHT	◆ SPREADER BAR HEIGHT
16-17-inches	5-inches
18-24-inches	7-inches

### ◆ Height of Spreader Bar from Bottom of Back Canes to Top of Spreader Bar Clamp.

17. If necessary, reposition the spreader bar at the correct height for the corresponding back height and torque the mounting hardware to 60-inch pounds.

18. Reinstall the armrest onto the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.

**B  
A  
C  
K  
F  
R  
A  
M  
E**



**FIGURE 2 - CHANGING BACK HEIGHT**

BACK FRAME

**BACK ANGLE ADJUSTMENT  
(FIGURE 3)**

1. Remove armrests from the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.
2. Remove the mounting screw and washer from the top mounting hole of **back angle plate** and **back cane**.

*NOTE: To avoid losing the insert in each back cane, thread the mounting screw through the cane from the inside of wheelchair to hold the insert in place.*

3. Remove the mounting screw and washer from the bottom mounting hole of the **back angle plate** and **back cane**.
4. Reposition the back canes into the correct mounting holes of the **back angle plate** to obtain a back angle between 80° and 100° in 5° increments.
5. Torque mounting screws to 75-inch pounds.
6. Reinstall the armrests onto the wheelchair. Refer to INSTALLING/REMOVING FLIP BACK ARMRESTS in PROCEDURE 4 of the owner's manual, 1081227.

TO ACHIEVE A BACK ANGLE OF:

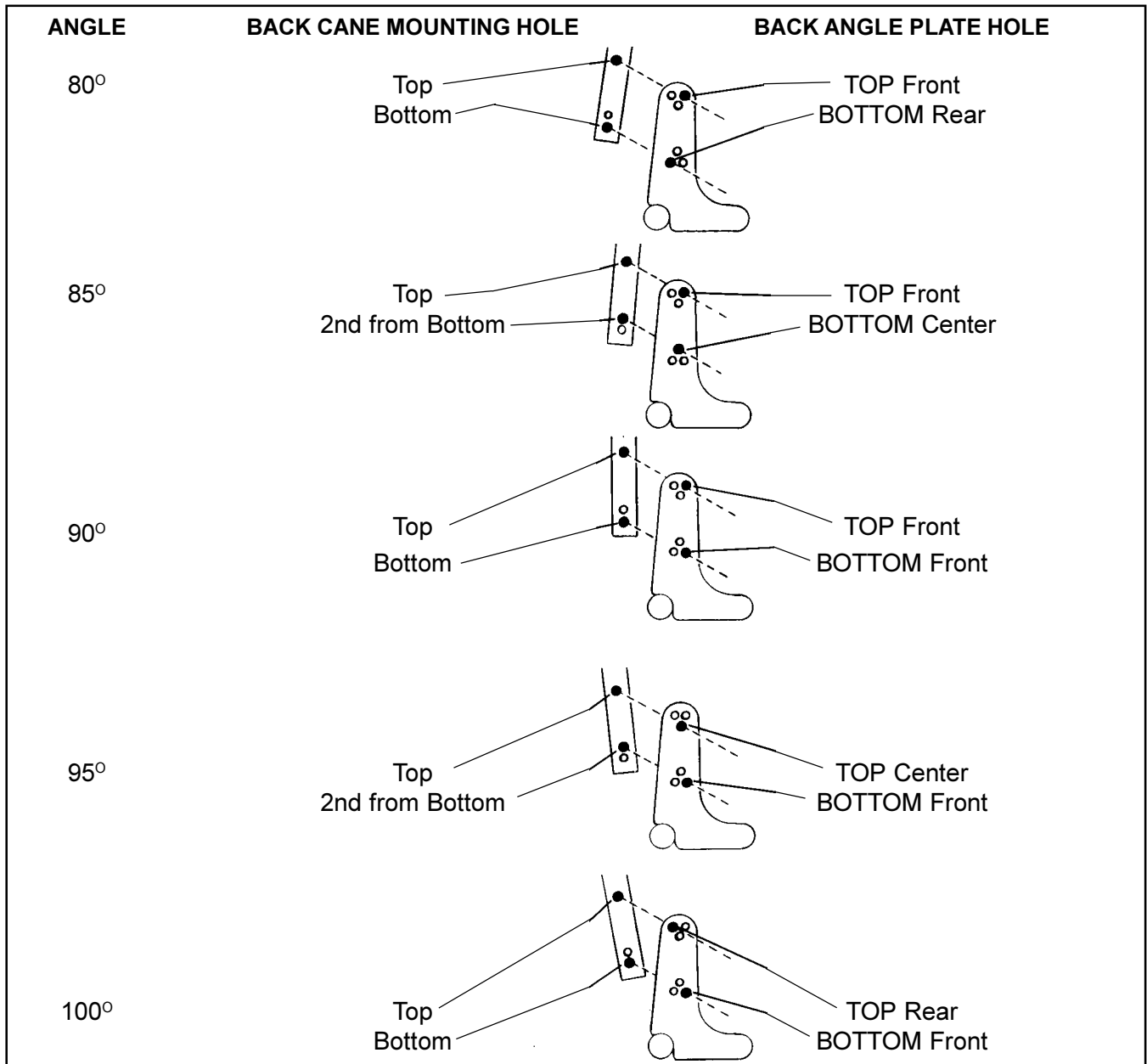


FIGURE 3 - BACK ANGLE ADJUSTMENT



**This Procedure Includes the Following:**  
**Installing/Removing Batteries Into/From Battery Box(es)**  
**Connecting Battery Cables**  
**When to Charge Batteries**  
**Charging Batteries**  
**Replacing Batteries**  
**Installing/Removing Group 24 Battery Boxes**  
**Installing/Removing Group 22NF Battery Boxes**

**WARNING**

Make sure power to the wheelchair is OFF before performing this procedure.

The use of rubber gloves and chemical goggles or face shields is recommended when working with batteries.

Invacare strongly recommends that battery installation and battery replacement ALWAYS be done by a qualified technician.

After ANY adjustments, repair or service and BEFORE use, make sure all attaching hardware is tightened securely - otherwise injury or damage may result.

**INSTALLING/REMOVING BATTERIES INTO/FROM BATTERY BOXES (FIGURE 1)**

NOTE: To remove the battery(ies) from the battery box(es), reverse the following procedure.

NOTE: Have the following tools available:

TOOL	QTY	COMMENTS
Battery Lifting Strap	1	Supplied
1/2-inch (6 pt) Box Wrench	1	Not Supplied

**WARNING**

ALWAYS use a battery lifting strap when lifting a battery. It is the most convenient method and assures that the battery acid will not spill. It also helps to prolong the life of the battery.

DO NOT tip the batteries. Keep the batteries in an upright position.

Place the wheelchair in a well ventilated area where work can be performed without risking damage to carpeting or floor covering.

The warranty and performance specifications contained in this manual are based on the use of deep cycle gel cell or sealed lead acid batteries. Invacare strongly recommends their use as the power source for this unit.

NOTE: If there is battery acid in the bottom or on the sides of the battery box(es) or battery(ies), apply baking soda to these areas to neutralize the battery acid. Before reinstalling the NEW or existing battery(ies), clean the baking soda from the battery box(es) or battery(ies).

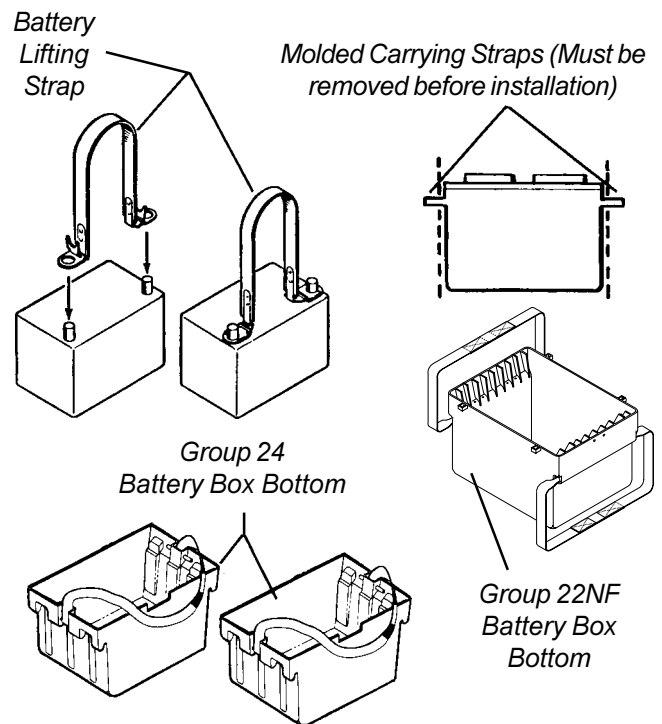
NOTE: When securing battery lifting strap to battery, observe polarity markings located on the ends of the battery lifting strap, (+) side to POSITIVE (+) battery post and (-) side to NEGATIVE (-) battery post.

1. If necessary, remove the battery boxes from the wheelchair. Refer to INSTALLING/REMOVING BATTERY BOXES - GROUP 24 BATTERY BASE FRAMES in this procedure of the manual.
2. Secure battery lifting strap to battery terminal(s)/post(s) (FIGURE 1).

**CAUTION**

Some battery manufacturers mold a carrying strap and/or hold down flanges directly into the battery case. Batteries which interfere with the battery box cannot be used for these applications. Attempting to "wedge" a battery into a battery box may damage the box and/or the battery.

3. Place batteries into battery box bottom.



**FIGURE 1 - INSTALLING/REMOVING BATTERIES INTO/FROM BATTERY BOXES**

**CONNECTING BATTERY CABLES  
(FIGURE 2)**

**WARNING**

NEVER allow any of your tools and/or battery cable(s) to contact BOTH battery post(s) at the same time. An electrical short may occur and serious personal injury or damage may occur.

The use of rubber gloves and chemical goggles or face shields is recommended when working with batteries.

When tightening the clamps, always use a box wrench. Pliers will “round off” the nuts. NEVER wiggle the battery terminal(s)/post(s) when tightening. The battery may become damaged.

The POSITIVE (+) RED battery cable MUST connect to the POSITIVE (+) battery terminal(s)/post(s), otherwise serious damage will occur to the electrical system.

B  
A  
T  
T  
E  
R  
I  
E  
S

3. Connect NEGATIVE <sup>N</sup> battery cable clamp to NEGATIVE (-) battery post and connect POSITIVE <sup>P</sup> battery cable clamp to POSITIVE (+) battery post (DETAIL “A”).
4. Secure the battery cable clamp(s) to the battery post(s) with provided hex screws and nuts. Securely tighten.
5. Verify battery cable clamps(s) are correctly installed and securely tightened.
6. Reposition battery clamp covers over battery post(s).
7. Install the battery box top(s).
9. Install the battery box(es) into the wheelchair. Refer to INSTALLING/REMOVING BATTERY BOX(ES) in this procedure of this manual.

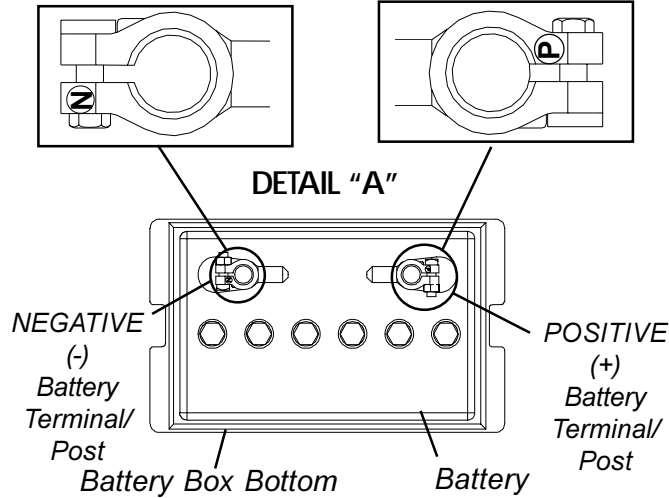
*NOTE: New Battery(ies) MUST be fully charged BEFORE using, otherwise the life of the battery(ies) will be reduced.*

10. If necessary, charge the battery(ies). Refer to CHARGING BATTERIES in this procedure of the manual.

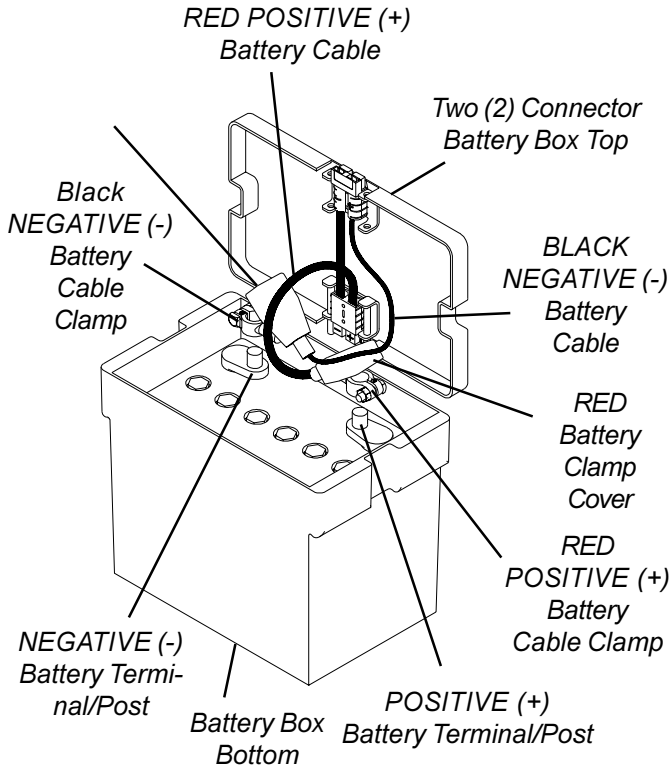
**Group 24 Batteries**

*NOTE: Perform this procedure on one (1) battery and battery box at a time. Repeat procedure for other battery box.*

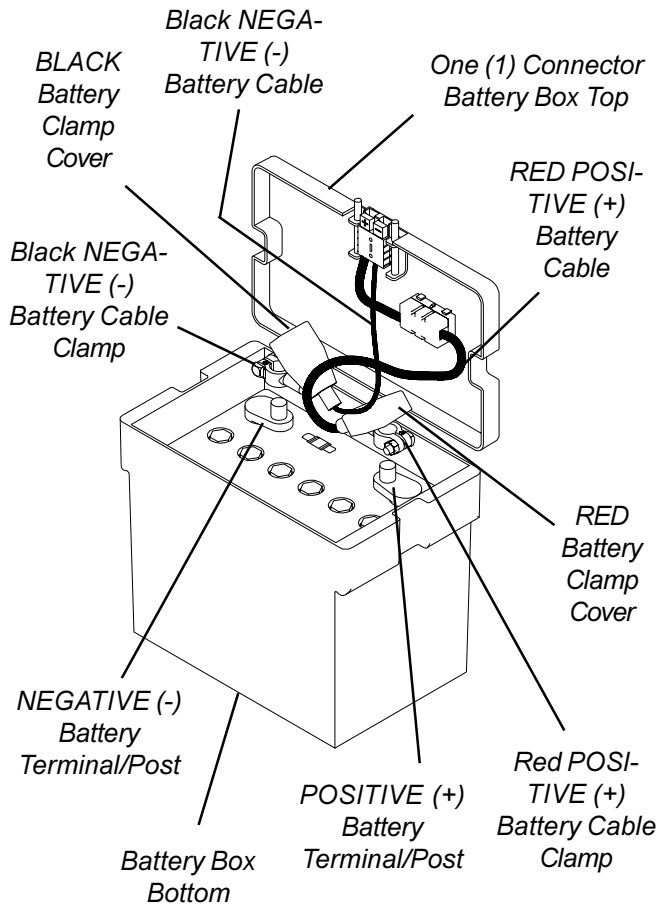
1. Position battery box top next to battery box bottom as shown in FIGURE 2.
2. Peel back battery clamp covers to expose battery clamp on each battery cable as follows:
  - A. RED battery clamp cover from RED battery cable.
  - B. BLACK battery clamp cover from BLACK battery cable.



**TWO (2) CONNECTOR BATTERY BOX**



**ONE (1) CONNECTOR BATTERY BOX**



**FIGURE 2 - CONNECTING BATTERY CABLE(S) - GROUP 24 BATTERIES**

**Group 22 Battery Base Frames (FIGURE 3)**

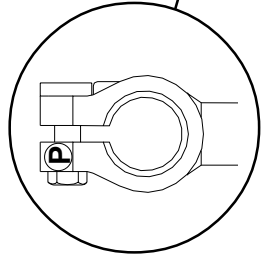
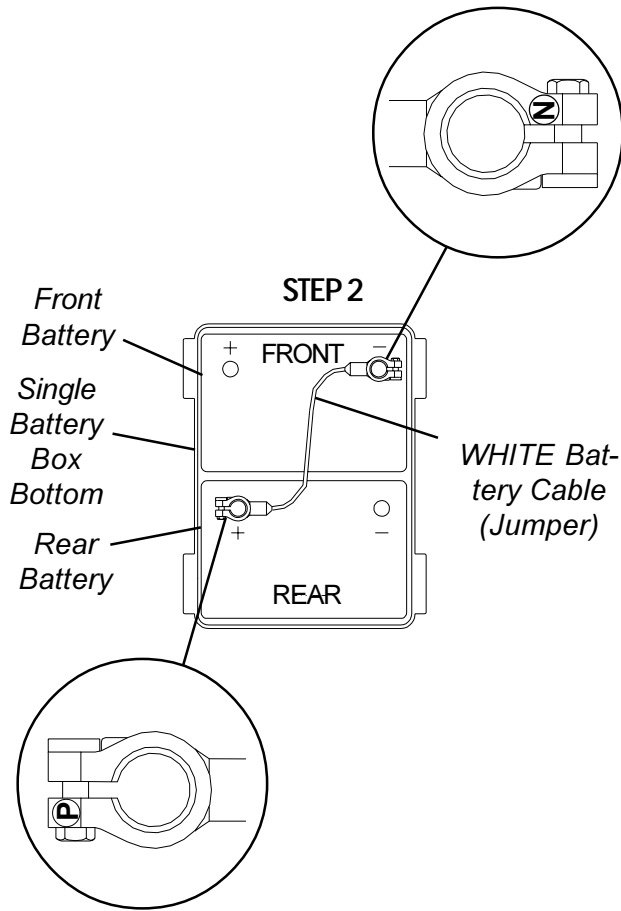
*NOTE: Refer to **WARNINGS** and **CAUTIONS** in the front of this procedure.*

*NOTE: Note polarity of white battery cable (jumper) battery terminal ends.*

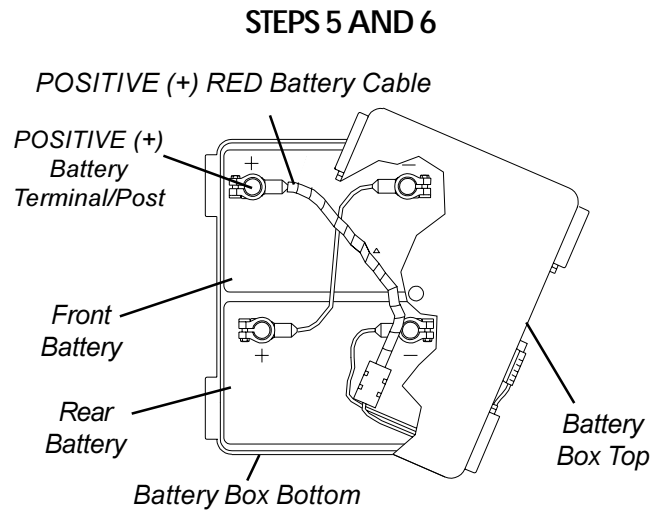
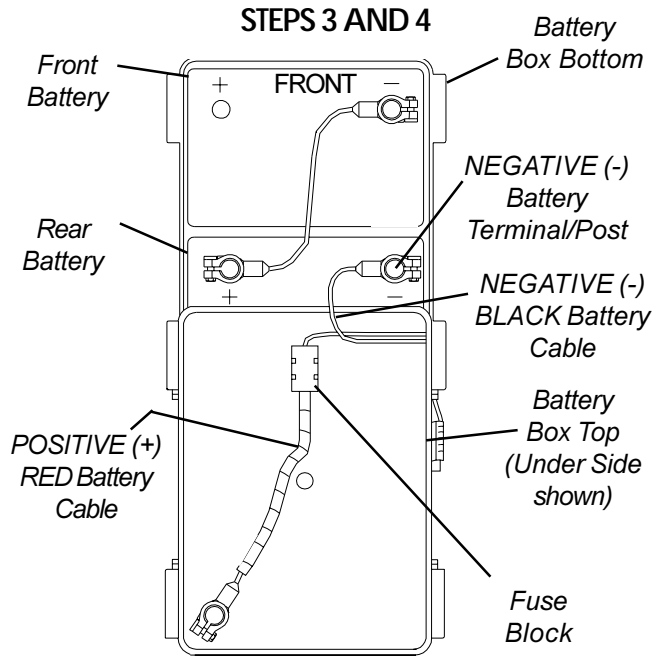
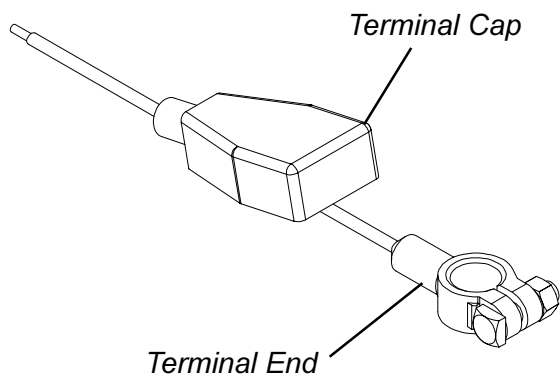
1. Remove battery terminal cap(s) from battery terminal(s) ends. Refer to DETAIL "A" in FIGURE 3.
2. Connect WHITE battery cable (jumper) NEGATIVE Ⓜ terminal end to NEGATIVE (-) battery terminal/post of front battery and connect POSITIVE Ⓟ terminal end to POSITIVE (+) battery terminal/post of rear battery.
3. Place battery top upside down on top of rear battery.
4. Connect NEGATIVE (-) BLACK battery cable of the battery box top to NEGATIVE (-) battery terminal/post of rear battery.
5. Position battery box top right side up and rotate outward toward right to expose POSITIVE (+) battery terminal/post of front battery.
6. Connect POSITIVE (+) RED battery cable on battery box top to POSITIVE (+) battery terminal/post of front battery.
7. Replace battery terminal cap(s) onto battery cable terminal end(s).
8. Rotate top toward left into position. Secure in place.
9. Install the battery box into the wheelchair. Refer to INSTALLING/REMOVING 22NF BATTERY BOX in the Owner's Manual supplied with the chair.

*NOTE: New Battery(ies) MUST be fully charged BEFORE using, otherwise the life of the battery(ies) will be reduced.*

10. If necessary, charge the battery(ies). Refer to CHARGING BATTERIES in the Owner's Manual supplied with the wheelchair.



DETAIL "A"

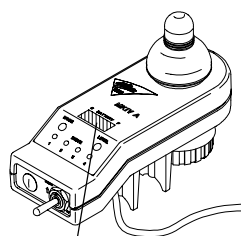


NOTE: Battery box top cut away for clarification purposes only.

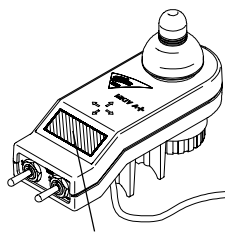
FIGURE 3 - CONNECTING BATTERY CABLES - SINGLE 22NF BATTERY BOX

**WHEN TO CHARGE BATTERIES (FIGURE 6)**

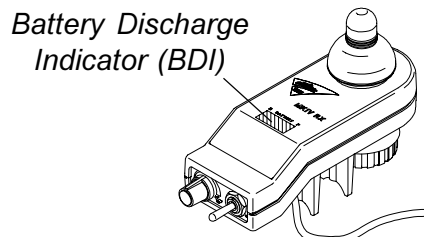
The Battery Discharge Indicator (BDI) is a bar graph display located on the MKIV joystick. It will keep you informed as to power availability. A visual warning is given before the power becomes too low to operate the wheelchair. At full charge the two (2) LEFT segments and the farthest RIGHT segment of the bar graph will be illuminated. As the battery becomes discharged, the farthest RIGHT segment will progressively move to the LEFT until only the last two (2) bars (LEFT) are illuminated. At this level the last two (2) bars (LEFT) will start to Flash ON and OFF to indicate that the end user should charge the batteries as soon as possible.



Battery Discharge Indicator (BDI)  
MKIV- A JOYSTICK



Battery Discharge Indicator (BDI) (in LCD Readout)  
MKIV- A+ JOYSTICK



MKIV- X JOYSTICK

FIGURE 6 - WHEN TO CHARGE BATTERIES

**CHARGING BATTERIES (FIGURE 7)**

*NOTE: New batteries MUST be fully charged prior to initial use of the wheelchair.*

**WARNING**

Never attempt to recharge the batteries by attaching cables directly to the battery terminals or clamps. Always use the recharging plug located on the side of the wheelchair frame.

DO NOT attempt to recharge the batteries and operate the power wheelchair at the same time.

During use and charging, unsealed batteries will vent hydrogen gas which is explosive in the right concentration with air.

**CAUTION**

Always charge new batteries before initial use or battery life will be reduced.

*NOTE: As a general rule, batteries should be recharged daily to assure the longest possible life and minimize the required charging time. Plan to recharge the batteries when it is anticipated the wheelchair will not be used for a long period of time.*

The range per battery charge using recommended batteries should be approximately 5 to 9 hours of typical operation. Extensive use on inclines may substantially reduce per charge mileage.

**Description and Use of Battery Chargers**

The charger automatically reduces the charge from an initially high rate to a zero reading at a fully charged condition. If left unattended, the charger should automatically shut-off when full charge is obtained.

**There are some basic concepts which will help you understand this automatic process. They are:**

The amount of electrical current drawn within a given time to charge a battery is called the "charge rate". If, due to usage, the charge stored in the battery is low, the charge rate is high, as indicated by the green light on the charger. Initially, the green light will stay illuminated for a short period of time followed by a longer period of off time. As a charge builds up, the charge rate is reduced, and the green light will stay illuminated for a longer period of time followed by a shorter off time.

**WARNING**

If the charger circuit breaker is tripping ON and OFF, unplug the charger and contact Invacare Technical Services, 1-800-832-4707.

*NOTE: If performing the charging procedures independently, READ and CAREFULLY follow the individual instructions for each charger (supplied or purchased).*

*NOTE: If charging instructions are not supplied, consult a qualified service technician for proper procedures.*

**Required Items:**

TOOL	QUANTITY	COMMENTS
Battery Charger	1	Supplied
◆ Extension Cord	1	Not Supplied

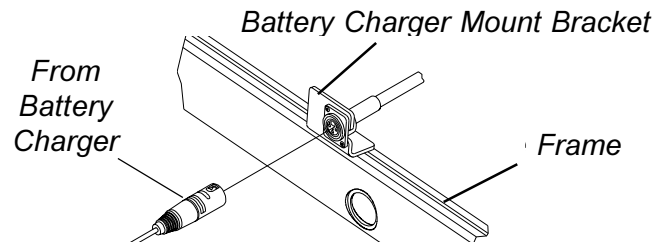
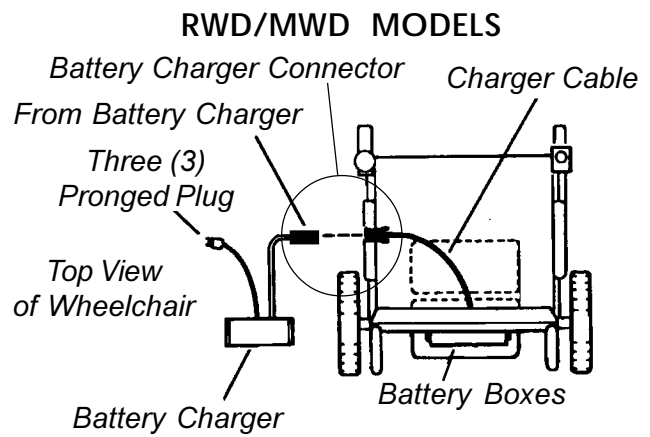
**◆ (3-prong plug, 15 ampere current rating; industrial type)**

1. Attach the battery charger connector to the charger cable/battery harness.

*NOTE: The battery charger connector is factory installed on the RIGHT side of the wheelchair. It can be positioned on either side of the wheelchair for user convenience.*

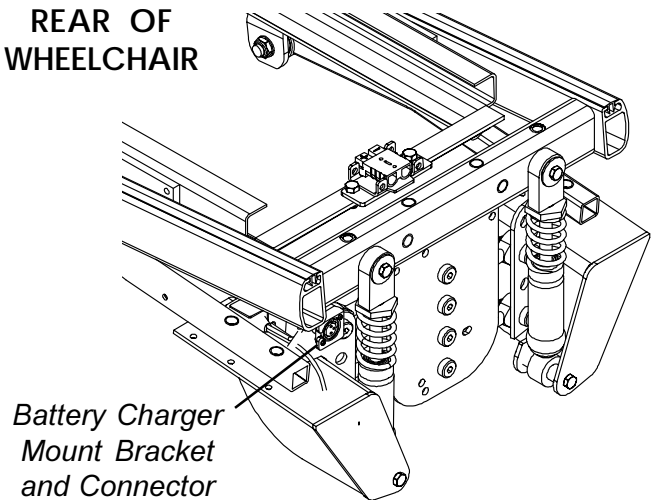
*NOTE FOR RECLINERS ONLY: If the wheelchair is a recliner, the battery charger connector as well as the limit switch, are factory set on the RIGHT side of the wheelchair. However, they can be positioned on either side for user convenience. The limit switch MUST BE positioned on the same side as the battery charger connector.*

2. Plug the charger's AC power cord, or extension, into the grounded 120 VAC wall outlet.
3. Wait until charging is complete.



**ARROW FWD MODEL**

**REAR OF WHEELCHAIR**



*NOTE: Shrouds and drive wheels not shown for clarification purposes only.*

**FIGURE 7 - CHARGING BATTERIES**

*NOTE: Allow eight (8) hours for normal charging. Larger batteries (greater than 55 ampere-hours) or severely discharged batteries may require up to sixteen (16) hours to be properly charged and equalized. If charger operates for sixteen (16) hours and is unable to fully charge the batteries, an internal timer turns the charger off and begins to fast blink the green light.*

It is advantageous to recharge frequently rather than only when necessary. In fact, a battery's life is extended if the charge level is maintained well above a low condition.

## REPLACING BATTERIES

*NOTE: Invacare recommends that both batteries be replaced if one (1) battery is defective.*

### Recommended Battery Types

#### WARNING

The warranty and performance specifications contained in this manual are based on the use of deep cycle gel cell or sealed lead acid batteries. Invacare strongly recommends their use as the power source for this unit.

Failure to use the correct battery size and/or voltage may cause damage to your wheelchair and give you unsatisfactory performance.

BATTERY SIZE POWER CHAIR	QTY	VOLTS		
			Standard	Optional
<b>Arrow</b>				
w/ motor/gearbox	2	12	Group 24	Group 22
w/ G/B motor	2	12	Group 22	Group 24
<b>Torque</b>				
with motor/gearbox	2	12	Group 22	Group 24
with G/B motor	2	12	Group 22	Group 24
<b>Torque SP</b>				
with motor/gearbox	2	12	Group 22	N/A
with G/B motor	N/A	N/A	N/A	N/A
<b>Storm X</b>				
with motor/gearbox	2	12	Group 22	Group 24
with G/B motor	2	12	Group 22	Group 24

*NOTE: G/B denotes gearless/brushless.*

*NOTE: Both battery sizes are deep cycle batteries.*

*NOTE: Charge batteries daily. It is critical not to let them run low at any time.*

1. Remove the battery box(es) from the wheelchair. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 22 BATTERY BOX in this procedure of the manual.
2. Remove the existing batteries from the battery box(es). Refer to INSTALLING/REMOVING BATTERIES INTO/FROM BATTERY BOX(ES) in this procedure of the manual.
3. Clean the new battery terminals. Refer to CLEANING BATTERY TERMINALS in this procedure of the manual.
4. Install the new batteries into the battery box(es). Refer to INSTALLING/REMOVING BATTERIES INTO/FROM BATTERY BOX(ES) in this procedure of the manual.

## Cleaning Battery Terminals

#### WARNING

Most batteries are not sold with instructions. However, warnings are frequently noted on the cell caps. Read them carefully.

DO NOT allow the liquid in the battery to come in contact with skin, clothes or other possessions. It is a form of acid and harmful or damaging burns may result. Should the liquid touch your skin, wash the area IMMEDIATELY and thoroughly with cool water. In serious cases or if eye contact is made, seek medical attention IMMEDIATELY.

1. Examine the battery clamps and terminals for corrosion.
2. Verify plastic caps are in place over the battery cell holes.
3. Clean the terminals and inside the battery clamps by using a battery cleaning tool, wire brush, or medium grade sand paper.

*NOTE: Upon completion, these areas should be shiny, not dull.*

4. Carefully dust off all metal particles.

## INSTALLING/REMOVING GROUP 24 BATTERY BOXES (FIGURE 8)

*NOTE: To remove the battery boxes from the wheelchair, reverse the following procedure.*

### Installing

*NOTE: FWD wheelchairs only - Remove the counterweight before performing this procedure. Refer to REMOVING/INSTALLING COUNTERWEIGHT in PROCEDURE 16 of this manual.*

1. Verify that the ON/OFF switch on the joystick is in the OFF position.
2. Place two (2) connector battery box onto the battery sub-frame assembly with guide pins facing the inside of the wheelchair.
3. Slide the two (2) connector battery box along the sub-frame until its guide pins are engaged in the sub-frame connector.
4. Secure the battery box carrying strap to the lid of the two (2) connector battery box.

*NOTE: Visually inspect to ensure the connection is properly made. Connectors MUST be fully engaged.*



*NOTE: Make certain that the carrying strap of the first battery box installed is positioned on top of the battery box and will not interfere with the second battery box guide pins during installation.*

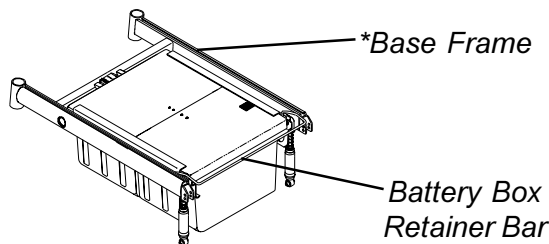
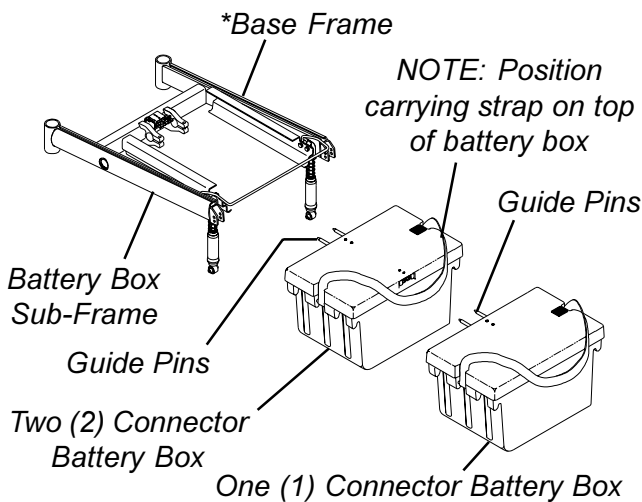
5. Place one (1) connector battery box onto battery sub-frame.
6. Slide one (1) connector battery box along the sub-frame until its guide pins are engaged in the connector of the two (2) connector battery box.
7. Secure the battery box carrying strap to the lid of the one (1) connector battery box.

*NOTE: Visually inspect to ensure the connection is properly made. Connectors MUST be fully engaged.*

**CAUTION**

The battery box retainer MUST be locked (clipped) securely to hold the battery boxes firmly in place or battery box connectors may be damaged causing erratic chair operation.

8. Pull the battery box retainer down over the end of front battery box until it is securely clipped (locked) into place.



*\*NOTE: Illustration depicts base frame for RWD and MWD models. Batteries remove/Install for the Arrow FWD in the same manner.*

**FIGURE 8 - INSTALLING/REMOVING GROUP 24 BATTERY BOXES**

**INSTALLING/REMOVING GROUP 22 BATTERY BOX (FIGURE 9)**

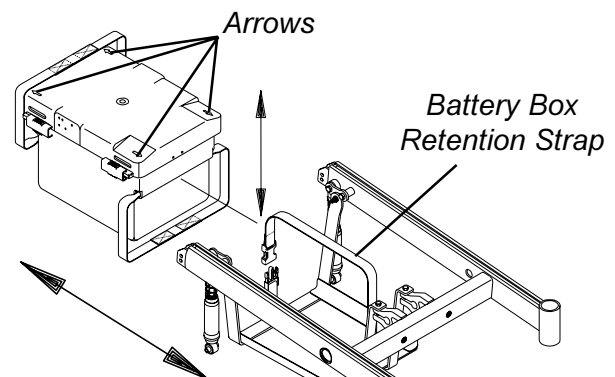
*NOTE: This procedure is for MWD/RWD chairs ONLY.*

*NOTE: To install the battery box onto the wheelchair, reverse the following procedure.*

1. Place the wheelchair in a well ventilated area where work can be performed without risking damage to carpeting or floor covering.
2. Verify that the ON/OFF switch on the joystick is in the OFF position.
3. Disconnect the battery cable from the outside of the battery box.
4. Disconnect the battery box retention strap.
5. Remove the battery box.
6. Slide the four (4) clips that secure the battery box cover to the battery box to the OPEN position.

*NOTE: Arrows on the battery box cover point to the open position.*

7. Remove battery box cover from the battery box.



**FIGURE 9 - INSTALLING/REMOVING GROUP 22 BATTERY BOX**

**This Procedure includes the following:**  
**Removing/Installing the Wiring Harness**  
**Adjusting Limit Switch**

**WARNING**  
 After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

**REMOVING/INSTALLING THE WIRING HARNESS (FIGURE 1)**

*NOTE: This procedure is for the FWD and MWD models ONLY. For the removing and installing the wiring harness on the Arrow FWD refer to REMOVING/INSTALLING WIRING HARNESS in PROCEDURE 17 of this manual.*

**Removing**

1. Remove the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 24 BATTERY BOX in PROCEDURE 9 of this manual.
2. Perform one (1) of the following:
  - For Group 24 Batteries** - remove the two mounting screws and locknuts that secure the wiring harness bracket to the base frame (DETAIL "A").
  - For Group 22 Batteries** - cut the tie wrap that secures the rear portion of the wiring harness and joystick cable to the rear of the seat frame (DETAIL "B").
3. Perform one (1) of the following sections:

**SECOND GENERATION WHEELCHAIRS WITH MOTOR/GEARBOX ASSEMBLY**

- A. Cut tie-wraps **A** and **B** that secure the two (2) motor/controller connections and the controller/wiring harness connection (BLUE connectors) together (DETAIL "C").
- B. Cut tie-wrap **C** that secures the battery charger cable, motor connector cable, controller connector cable, and wiring harness cable to the base frame (DETAIL "C").

**SECOND GENERATION WHEELCHAIRS WITH GEARLESS/BRUSHLESS MOTOR**

- A. Cut tie-wrap **A** that secures the battery charger cable to the base frame (DETAIL "B").

*NOTE: For STEPS 4-6 refer to Detail "C" or "D".*

4. Disconnect the battery harness/charger cable (**BLUE**) from the controller connector (**BLUE**).
5. Remove the two mounting screws that secure the charger cable to the mounting bracket.
6. Remove the wiring harness.

**Installing**

1. **For Group 24 Batteries Only** - Install NEW wiring harness w/bracket to the rear of the sub-frame and torque mounting screws to 160-inch pounds (DETAIL "A").
2. **For Group 22 and Group 24 Batteries** - Secure the charger cable to the mounting bracket with the two (2) mounting screws. Securely tighten (DETAIL "C" OR "D").
3. **For Group 22 and Group 24 Batteries** - Connect the battery harness/charger cable (**BLUE**) to the controller connector (**BLUE**) (DETAIL "C" or "D").
4. Perform one (1) of the following sections:

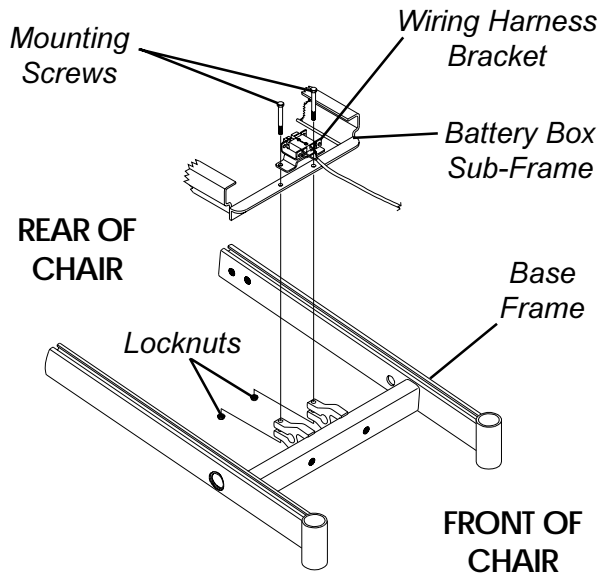
**SECOND GENERATION WHEELCHAIRS WITH MOTOR/GEARBOX ASSEMBLY**

- A. **For Group 22 and Group 24 Batteries** - Group the two (2) motor/controller connections together along with the controller/wiring harness connection (**BLUE**) and secure with **TIE-WRAPS A and B** (DETAIL "C").
- B. **For Group 22 and Group 24 Batteries** - Secure the Wiring Harness Cable, Battery Charger Cable, Controller Connector Cable, and Motor Connector Cable to the suspension arm with **TIE-WRAP C** (DETAIL "C").

**SECOND GENERATION WHEELCHAIRS WITH GEARLESS/BRUSHLESS MOTOR OPTION:**

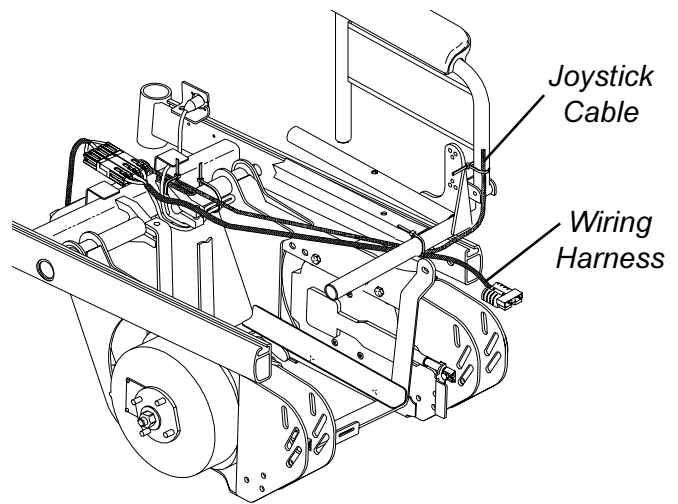
- A. **For Group 22 and Group 24 Batteries** - Secures the battery charger cable to the base frame with **TIE-WRAP A** (DETAIL "D").
5. **For Group 22 Batteries Only** - Tie-wrap NEW wiring harness and joystick cable to the rear of the seat frame (DETAIL "B").
6. Reinstall the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.

DETAIL A - GROUP 24 BATTERIES



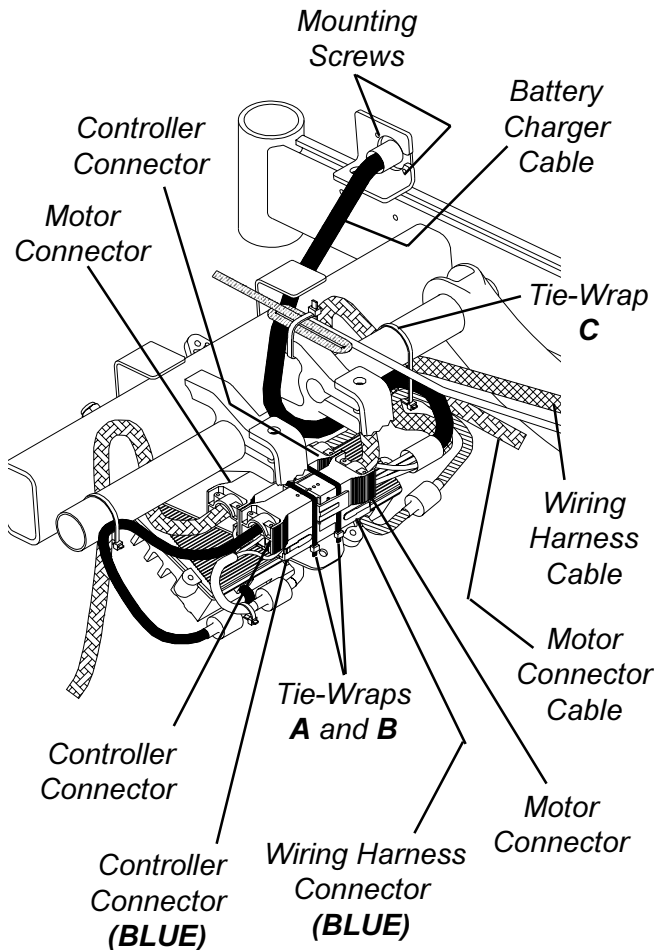
NOTE: Battery box sub-frame exploded away for clarification purposes only.

DETAIL B - GROUP 22 BATTERIES

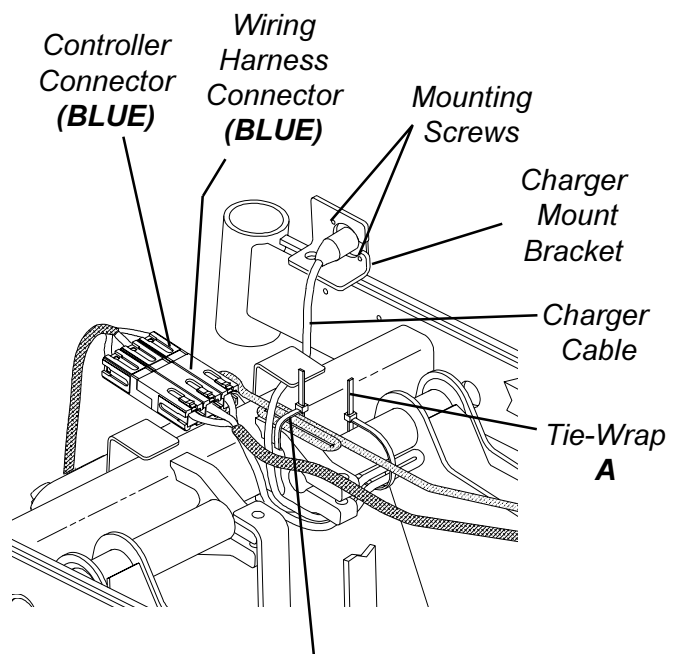


NOTE: Illustration depicts gearless/brushless motor. Wiring harness is secured to the rear of the seat frame in the same manner for wheelchairs with conventional motor/gearbox assembly.

DETAIL "C" - SECOND GENERATION WHEELCHAIRS



DETAIL "D" - SECOND GENERATION WHEELCHAIRS WITH GEARLESS /BRUSHLESS MOTOR



NOTE: There is no need to cut this tie-wrap.

FIGURE 1 - REMOVING/INSTALLING THE WIRING HARNESS

**ADJUSTING LIMIT SWITCH  
(FIGURE 2)**

*NOTE: The following procedure is for high back captains van seat model wheelchairs only.*

**WARNING**

**NEVER** operate the wheelchair while in any recline position over 114° RELATIVE TO THE SEAT FRAME. If the limit switch does not stop the wheelchair from operating in a recline position greater than 114° RELATIVE TO THE SEAT FRAME, **DO NOT** operate the wheelchair. Adjust the limit switch **BEFORE** using the wheelchair, otherwise injury or damage can occur.

1. Place the wheelchair on a level surface.
2. Recline the captains van seat back to a 24° to achieve the 114° angle relative to the seat frame. Refer to ADJUSTING CAPTAINS VAN SEAT in PROCEDURE 4 of the owner's manual, 1081227.

*NOTE: The captains van seat frame is at a 5° angle relative to the ground. When the back angle is adjusted to 114° relative to the seat, it will measure 61° relative to the ground.*

*NOTE: To determine 114° back angle relative to the seat frame, place a magnetic protractor (available at any hardware store) on the back as shown in FIGURE 2 and adjust the back until the magnetic protractor reads 61°.*

3. Turn the wheelchair power switch on the joystick to the ON position.

*NOTE: The wheelchair should not operate.*

4. **IF** wheelchair operates, proceed to the following steps to adjust the actuator on the upper limit switch bracket:

- A. Fully recline the back. Refer to ADJUSTING CAPTAINS VAN SEAT in PROCEDURE 4 of the Owner's Manual, 1081227.

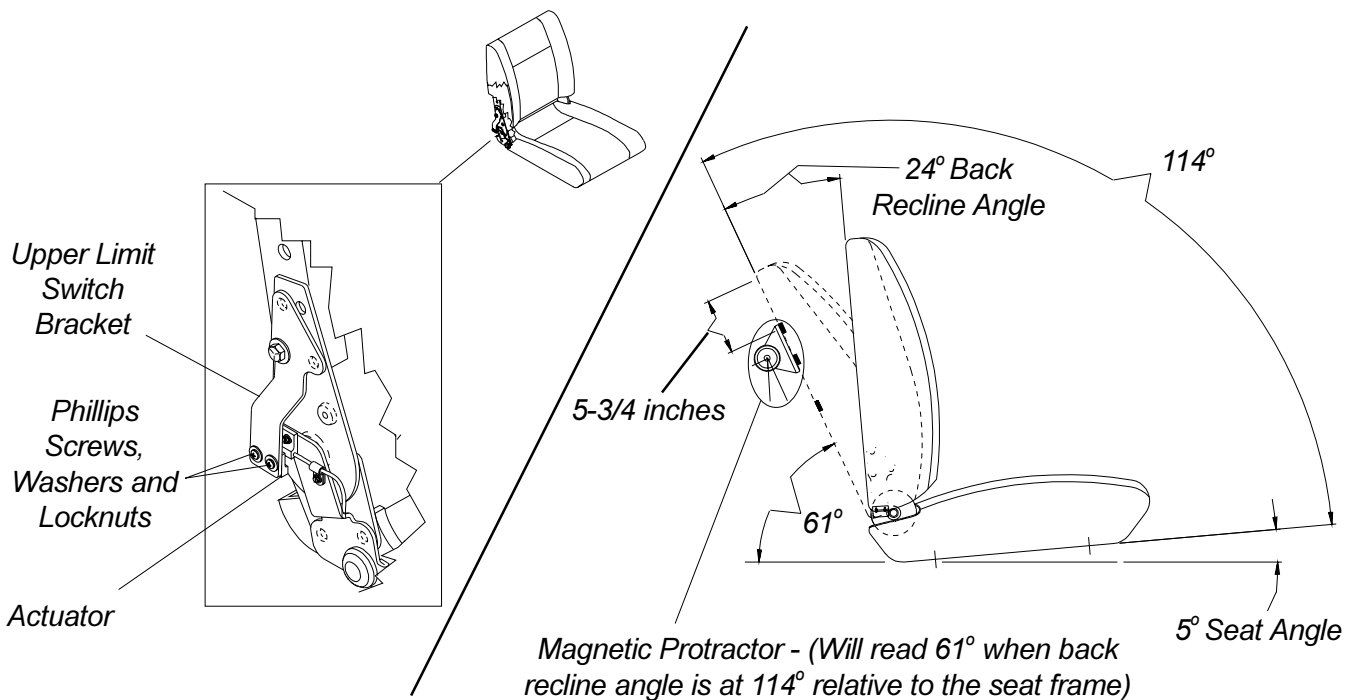
*NOTE: This will make access to the limit switch easier.*

- B. Loosen, but do not remove, the two (2) phillips screws, washers and locknuts that secure the actuator to the upper limit switch bracket.
- C. Slide the actuator UP (towards the top of the wheelchair).

**CAUTION**

**DO NOT** over tighten the phillips screws that secure the actuator to the upper limit switch bracket. Damage to the actuator can occur.

- D. Only tighten the two (2) phillips screws, washers and locknuts that secure the actuator to the upper limit switch bracket until the actuator does not move.
- E. Repeat STEPS 1-3 until the wheelchair does not operate when the captains van seat back is at a 24° angle.



**FIGURE 2 - ADJUSTING LIMIT SWITCH**

***This Procedure Includes the Following:******Replacing Battery Box Retainer Bar/ Retainer Clip  
-Group 24 Battery Base Frames*****WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

## **REPLACING BATTERY BOX RETAINER BAR/RETAINER CLIP - GROUP 24 BATTERY BASE FRAMES (FIGURE 1)**

1. Remove the battery box. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.

### **Replacing Retainer Clip**

1. Perform one (1) the following:
  - A. **RWD AND MWD MODELS** - Remove the mounting screw that secures the retainer clip and shock (or rubber element) to the base frame.
  - B. **FWD MODEL** - Remove the mounting screw, washer, spacer, and locknut that secure the retainer clip to the battery box sub-frame.
2. Remove the existing retainer clip.
3. Perform one (1) the following:
  - A. **RWD AND MWD MODELS** - Position the NEW retainer clip between the shock (or rubber element) and the battery box sub-frame as shown in FIGURE 1. Make sure the angled end of the retainer clip is facing up.
  - B. **FWD MODEL** - Position the NEW retainer clip between the spacer and the battery box sub-frame as shown in FIGURE 1. Make sure the angled end of the retainer clip is facing upwards.

**WARNING**

The Battery Box Retainer Bar/Retainer Clip MUST be fastened securely in place before using the wheelchair. Use Loctite 242 and torque to 160-inch pounds.

4. Perform one (1) the following:
  - A. **RWD AND MWD MODELS** -Reinstall the mounting screw that secures the retainer clip and shock (or rubber element) to the base frame. Use Loctite 242 and torque to 160-inch pounds.

- B. **FWD MODEL** - Reinstall the mounting screw, washer, spacer, and locknut that secure the retainer clip to the battery box sub-frame. Use Loctite 242 and torque to 160-inch pounds.

5. Reinstall the battery boxes. Refer to INSTALLING/REMOVING BATTERY BOXES - GROUP 24 BATTERY BASE FRAMES in PROCEDURE 9 of this manual.

### **Replacing Retainer Bar**

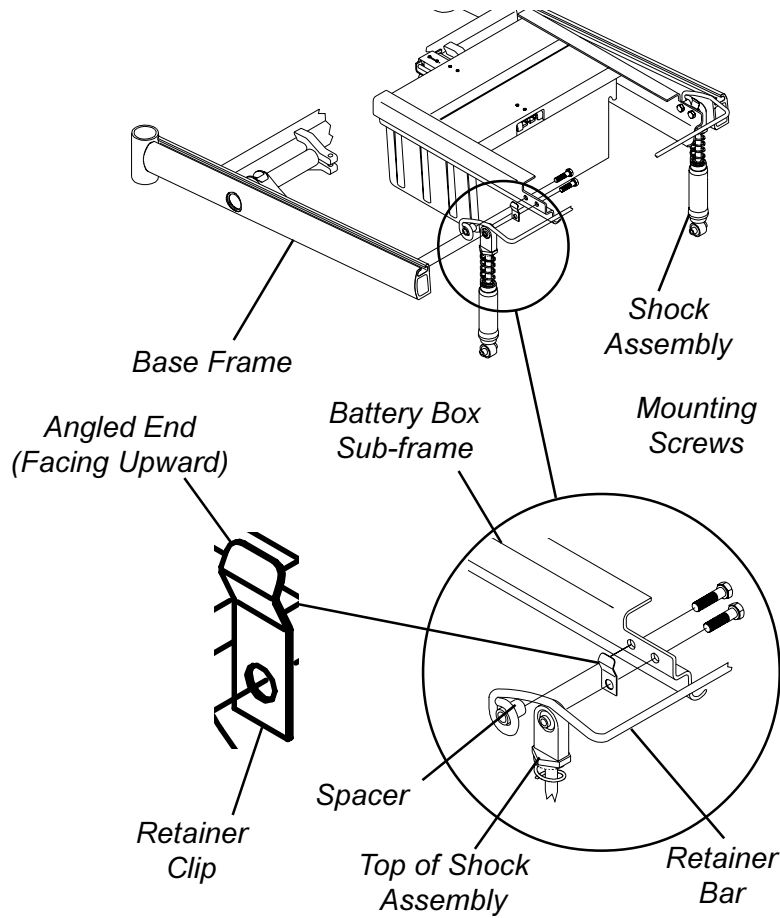
1. Perform one (1) the following:
  - A. **RWD AND MWD MODELS** -Remove the two (2) mounting screws and spacers that secure the battery box retainer bar to the base frame.
  - B. **FWD MODELS** - Remove the two (2) mounting screws, spacers, washers, and locknuts that secure the retainer bar to the battery box sub-frame.
2. Pull up on the battery box retainer bar to remove it from the base frame.
3. Install the two (2) existing spacers through the mounting holes in the **NEW** battery box retainer bar.

**WARNING**

The Battery Box Retainer Bar/Retainer Clip MUST be fastened securely in place before using the wheelchair. Use Loctite 242 and torque to 160-inch pounds.

4. Perform one (1) the following:
  - A. **RWD AND MWD MODELS** - Line up the NEW battery box retainer bar and spacers with the mounting holes in the battery box sub frame and the base frame.
  - B. **FWD MODELS** - Line up the NEW battery box retainer bar and spacers with the mounting holes in the battery box sub frame.
5. Perform one (1) the following:
  - A. **RWD AND MWD MODELS** - Reinstall the mounting screws that secure the battery box retainer bar between battery box sub frame and the base frame. Use Loctite 242 and torque to 160-inch pounds.
  - B. **FWD MODELS** - Reinstall the mounting screws that secure the battery box retainer bar onto battery box sub frame. Use Loctite 242 and torque to 160-inch pounds.
6. Reinstall the both battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.

RWD AND MWD MODELS



FWD MODELS

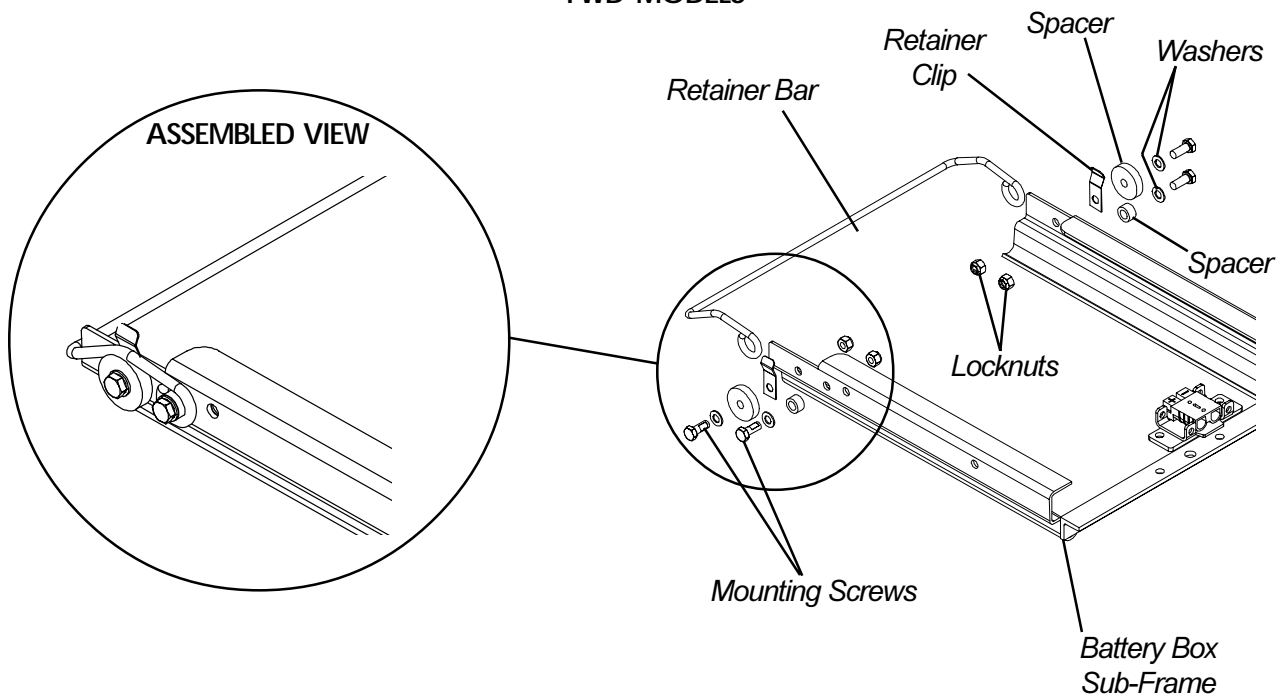


FIGURE 1 - REPLACING BATTERY BOX RETAINER BAR/RETAINER CLIP - GROUP 24 BATTERY BASE FRAMES

- This Procedure includes the following:**
- Replacing Pneumatic Tires/Tubes - Drive Wheels/ Casters
  - Removing/Installing Drive Wheels
  - Removing/Installing Drive Wheel Hub
  - Installing Wheel Lock Bracket onto Wheelchair
  - Removing/Installing Casters
  - Replacing Forks
  - Motor Replacement

**WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure all attaching hardware is tightened securely - otherwise injury or damage may result.

**CAUTION**

As with any vehicle, the wheels and tires should be checked periodically for cracks and wear and should be replaced.

**REPLACING PNEUMATIC TIRES/ TUBES - DRIVE WHEELS/CASTERS**

**WARNING**

DO NOT use your wheelchair unless it has the proper tire pressure (p.s.i.). DO NOT overinflate the tires. Failure to follow these suggestions may cause the tire to explode and cause bodily harm.

If tires are pneumatic, replacement of tire or tube MUST be performed by an authorized Invacare dealer or qualified technician.

*NOTE: If drive wheels or casters are pneumatic, under-inflation causes excessive wear which results in poor performance of the tires.*

**REMOVING/INSTALLING DRIVE WHEELS (FIGURE 1)**

**CAUTION**

Perform the following procedure in a designated work area to prevent damage to flooring (carpeting, tile, etc.).

**Removing**

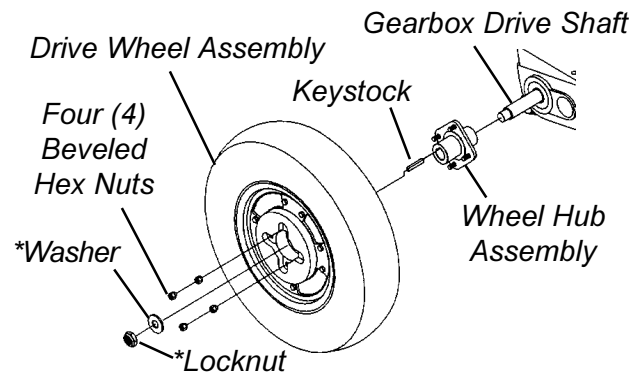
1. Remove the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 22 BATTERY BOXES in PROCEDURE 9 of this manual.

2. Remove the four (4) beveled hex nuts that secure the drive wheel assembly to the wheel hub assembly.
3. Remove existing drive wheel assembly from wheel hub.

**Installing**

1. Reinstall new/existing drive wheel assembly to the wheel hub assembly and torque the four (4) beveled hex nuts to 160-inch pounds.
2. Repeat procedure for opposite side of wheelchair, if necessary.
3. Reinstall the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 22 BATTERY BOXES in PROCEDURE 9 of this manual.

**CONVENTIONAL MOTOR WITH GEARBOX**



*\*NOTE: It is not required to remove the locknut and washer to remove the drive wheel.*

**GEARLESS/BRUSHLESS MOTOR**

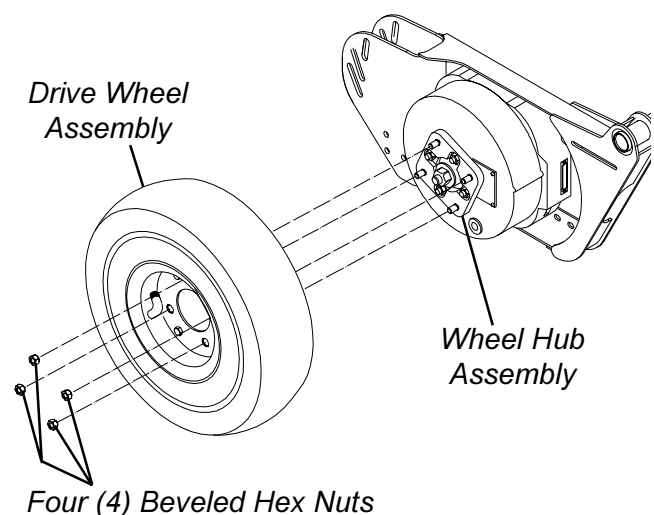


FIGURE 1 - REMOVING/INSTALLING DRIVE WHEELS

**REMOVING/INSTALLING DRIVE WHEEL HUB (FIGURE 1)**

*NOTE: This procedure can only be performed on second generation storm wheelchairs with the conventional motor/gearbox assembly. On second generation storm wheelchairs with the gearless/brushless motor, the drive wheel hub CANNOT be removed. Return motor to manufacturer for service.*

**Removing**

1. Remove the drive wheel from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in this procedure of the manual.
2. Remove the locknut, washer, keystick and existing drive wheel hub from the drive shaft of the gearbox.

**Installing**

1. Position the keystick on the gearbox drive shaft.

**CAUTION**

**DO NOT** apply more than a one (1)-inch (in length) thin film of anti-seize compound to the drive shaft. Applying more than one (1)-inch (in length) can cause the anti-seize compound to leak resulting in damage to flooring (carpet, tile, etc.).

2. Apply a thin film of anti-seize compound one (1) inch in length to the end of the drive shaft.
3. Reinstall drive wheel hub onto the gearbox drive shaft.

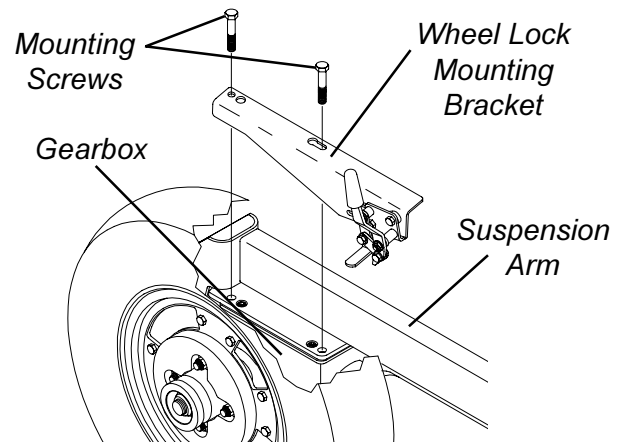
*NOTE: While installing the drive wheel hub onto the drive shaft, spin the drive wheel hub to evenly distribute the anti-seize compound over the entire drive shaft.*

4. Reinstall the washer and locknut and torque locknut to **45 foot pounds (540-inch pounds)**.
5. Reinstall the drive wheel assembly to the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in this procedure of the manual.
6. Repeat procedure for the opposite side of the wheelchair, if necessary.

**INSTALLING WHEEL LOCK BRACKET ONTO WHEELCHAIR (FIGURE 2)**

*NOTE: This procedure only pertains to second generation storm wheelchairs with the conventional motor and gearbox. On second generation storm wheelchairs with the gearless/brushless motor, the wheel lock bracket is not required.*

1. Remove the two (2) mounting screws closest to the large wheel that secure the gearbox to the suspension arm.
2. Line up mounting holes in the wheel lock mounting bracket with the gearbox mounting holes in the suspension arm.
3. Apply Loctite 242 to the two (2) mounting screws.
4. Reinstall the two (2) mounting screws into the mounting holes of the wheel lock mounting bracket and gear box and torque to 75-inch pounds.
5. Repeat STEPS 1-4 for opposite wheel lock bracket.
6. Adjust the wheel locks. Refer to ADJUSTING WHEEL LOCKS in PROCEDURE 9 of the owner's manual, 1081227.



**FIGURE 2 - INSTALLING WHEEL LOCK BRACKET ONTO WHEELCHAIR**



**REMOVING/INSTALLING CASTERS (FIGURE 3)**

**WARNING**

DO NOT use your power wheelchair unless it has the proper tire pressure (p.s.i.). DO NOT over-inflate the tires. Failure to follow these suggestions may cause the tire to explode and cause bodily harm. The recommended tire pressure is listed on the side wall of the tire.

Periodically, the tires will need to be replaced due to wear or puncture.

**Removing Casters**

1. Remove the mounting screw, spacers and locknut that secure the existing caster to the fork.
2. Remove the existing caster from the fork.

**Installing Casters**

1. Position the new/existing caster into the fork.
2. Reinstall the mounting screw, spacers and locknut that secure the caster to the fork.
3. Torque locknut to 10-foot pounds (120-inch) pounds.
4. Loosen the locknut 1/8 of a turn.
5. Move the caster side to side.

*NOTE: If the caster moves side to side, tighten the locknut slightly. Repeat STEP 4 until there is no side to side movement of the caster.*

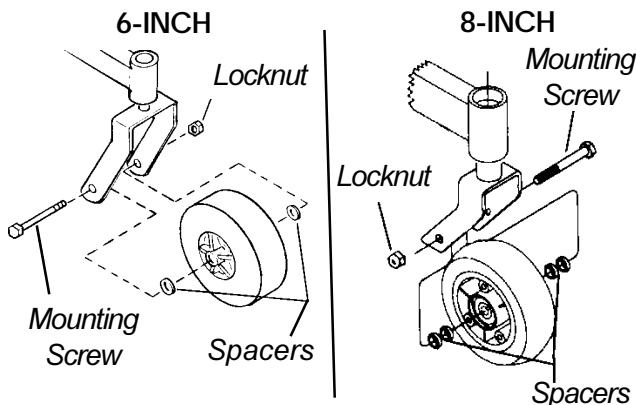


FIGURE 3 - REMOVING/INSTALLING CASTERS

**REPLACING FORKS (FIGURE 4)**

1. Remove the caster from the existing fork. Refer to REMOVING/INSTALLING CASTERS in this procedure of the manual.
2. Remove the head tube cap.
3. Remove the locknut and nylon washer.
4. Drop the existing fork out of the caster head tube.
5. Slide the new fork into the caster head tube.

*NOTE: Check bearing assemblies. Replace if necessary.*

6. Ensure new fork slides completely into caster headtube.
7. Install nylon washer and secure with locknut.

**WARNING**

Improper positioning of the washer will prohibit the free movement of the forks.

8. Install the caster onto the new fork. Refer to REMOVING/INSTALLING CASTERS in this procedure of the manual.
9. Adjust the forks. Refer to ADJUSTING FORKS in PROCEDURE 9 of the owner's manual, 1081227

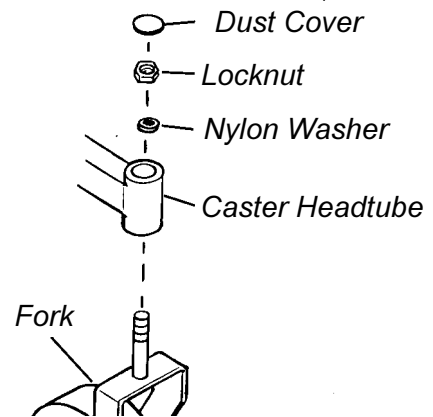


FIGURE 4 - REPLACING FORKS

**REMOVING/INSTALLING THE MOTOR (CONVENTIONAL MOTOR WITH GEARBOX) (FIGURE 5)**

**Removing**

**RWD AND MWD MODELS.**

1. Disconnect the right and/or left motor connector from the controller.
2. Remove the two (2) allen screws and washers that secure the motor to the gearbox.

**CAUTION**

DO NOT damage the motor/gearbox coupling.

3. Carefully pull the motor away from the gearbox.

**ARROW FWD MODEL.**

1. Remove the front shroud. Refer to REMOVING/INSTALLING SIDE SHROUD ASSEMBLY in PROCEDURE 17 of this manual.
2. Remove the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in PROCEDURE 17 of this manual.
3. Remove the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.

4. Remove the two (2) mounting screws, spacers, and washers that secure the MKIV controller to the base frame. Set MKIV controller onto ground/floor.

*NOTE: STEPS 5, 6, and 7 are necessary to obtain easier access to the motor/controller connection.*

5. Remove the mounting screw and spacer that secure the top of the shock to the base frame.
6. Loosen, DO NOT remove, the mounting screw that secures the bottom of the shock to the suspension arm.
7. Rotate top of shock toward the inside of the wheelchair.
8. Disconnect the motor connector from controller.
9. Remove the two (2) allen screws and washers that secure the motor to the gearbox.

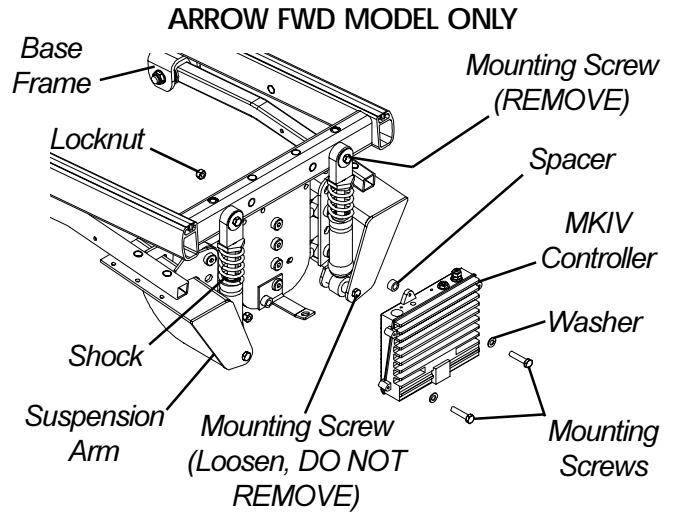
10. Carefully pull the motor away from the gearbox.

**CAUTION**  
DO NOT damage the motor/gearbox coupling.

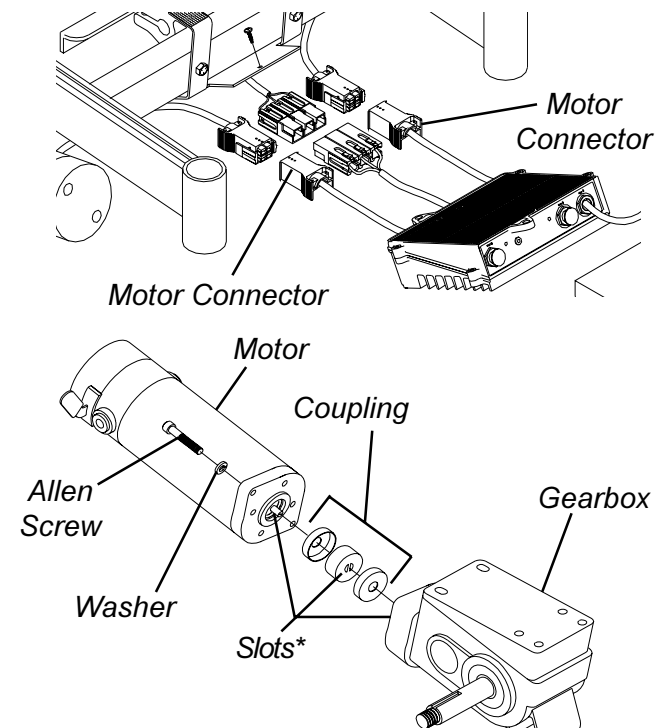
**Installing**

1. Perform one (1) of the following:
    - A. For **RWD and MWD** perform STEPS 2-3.
    - B. For **FWD ONLY** perform STEPS 2-10.
  2. Perform the following:
    - A. Inspect the coupling for wear and damage. If damage is evident, replace coupling.
    - B. Install coupling onto gearbox input shaft inserting coupling drive plate onto slot on shaft.
    - C. Carefully align motor and coupling and place motor against gearbox.
    - D. With motor against gearbox, turn gearbox drive shaft until the coupler seats into gearbox.
- NOTE: When properly aligned, motor will be seated into gearbox.*
- E. Install two (2) allen screws. Use Loctite 242, tighten allen screws evenly and then torque to 75-inch lbs.
3. Reconnect right and/or left motor connector to controller.
  4. Rotate the top of the shock of the shock toward the inside of the wheelchair.
  5. Install the mounting screw and spacer that secure the top of the shock to the base frame. Torque to 156 - inch pounds.
  6. Tighten the mounting screw that secures the bottom of the shock to the suspension arm. Torque to 156 - inch pounds.
  7. Install the two mounting screws that secure the MKIV controller to the base frame. Torque to 156 - inch pounds.

8. Install the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
9. Install the counterweight. Refer to REMOVING/INSTALLING THE COUNTERWEIGHT in PROCEDURE 17 of this manual.
10. Install the front shroud. Refer to REMOVING/INSTALLING FRONT SHROUD in PROCEDURE 17 of this manual.



**RWD, MWD, AND ARROW FWD MODELS**



*\*NOTE: The following slot locations must line up for proper installation: Slots on coupling of motor, the slots on the coupling and the slots on the gearbox.*

**FIGURE 5 - REMOVING/INSTALLING THE MOTOR - CONVENTIONAL MOTOR/GEARBOX FOR RWD, MWD AND FWD MODELS**

## REMOVING/INSTALLING THE MOTOR (GEARLESS/BRUSHLESS MOTOR) (FIGURE 6)

### Removing

1. Remove the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 22 BATTERY BOXES in PROCEDURE 9 of this manual.
2. Unthread the mounting screws that secure the wiring harness connector to the motor (DETAIL "A").
3. Unplug the wiring harness connector from the motor.
4. If necessary, remove the group 22 battery box tray. Refer to REMOVING/INSTALLING GROUP 22 BATTERY BOX TRAY in PROCEDURE 16 of this manual.
5. Remove the drive wheel from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in this procedure of the manual.
6. Note the mounting position of the motor on the suspension arm before removing the motor.
7. Loosen adjustment screw that secures the motor lock lever in place on the brake release shaft.

*NOTE: Alignment pin is located inside of bushing guide on the suspension arm.*

8. Remove the mounting screw and washer that secure the alignment pin in place.
9. Slide the alignment pin back out of the end of the motor lock lever.
10. Remove the four (4) mounting screws and washers that secure the motor to the suspension arm.
11. Remove motor with motor lock lever from suspension arm.
12. If replacing motor, remove the motor lock lever from the brake release shaft of the existing motor.

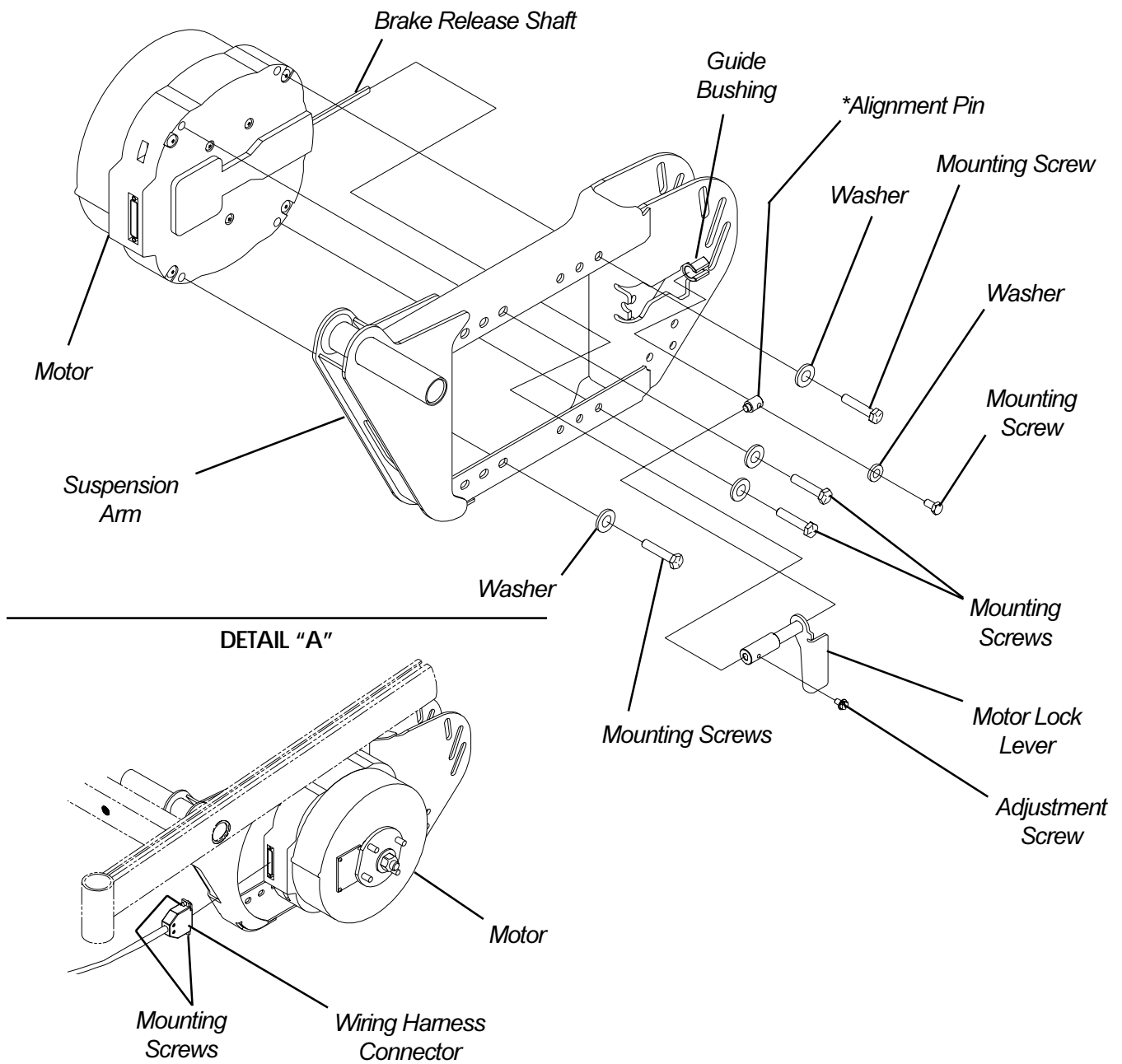
### Installing

*NOTE: Do not tighten adjustment screw of motor lock lever until motor is secured in place on the suspension arm.*

1. If necessary, install motor lock lever onto new brake release shaft of motor.
2. Position the new/existing motor with motor lock lever onto the suspension arm in the mounting position noted from STEP 4 of REMOVING THE GEARLESS/BRUSHLESS MOTOR in this procedure of the manual.

3. Secure motor to the suspension arm with existing four (4) mounting screws. Torque to 13 foot/pounds.
4. Slide the motor lock lever along brake release shaft until the end is flush with the bushing guide.
5. Slide alignment pin, located inside of bushing guide, into the end of the motor lock lever and secure in place with existing mounting screw and washer. Securely tighten.
6. Secure motor lock lever in place on the brake release shaft with existing mounting screw.
7. Install the drive wheel from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in this procedure of the manual.
8. If necessary, install the group 22 battery box tray. Refer to REMOVING/INSTALLING GROUP 22 BATTERY BOX TRAY in PROCEDURE 16 of this manual.
9. Plug the wiring harness connector into the motor.
10. Secure the wiring harness connector to the motor with the existing two (2) mounting screws.
11. Remove the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 22 BATTERY BOXES in PROCEDURE 9 of this manual.

WHEELS / MOTORS



*\*NOTE: Alignment pin exploded away suspension arm for clarification purposes only.*

FIGURE 2 - REMOVING/INSTALLING MOTOR - GEARLESS/BRUSHLESS

**This Procedure Includes the Following:****Repositioning MKIV Joystick - Van Seat Models  
Removing/Installing MKIV Controller****WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

**REPOSITIONING MKIV JOYSTICK -  
VAN SEAT MODELS (FIGURE 1)**

1. Turn the lever on the adjustment lock to release the adjustment lock from joystick mounting tube.
2. Remove the joystick mounting tube from wheelchair.
3. Remove the three (3) hex bolts, spacers and locknuts that secure joystick mounting bracket to armrest plate.
4. Remove the phillips screws that secures the front of the armrest pad to the armrest plate.
5. Remove the phillips screw that secures the rear of the armrest pad and armrest insert to the armrest plate.
6. Remove the armrest pad from the armrest plate.
7. Remove the lug bolt, washers and locknut that secure the existing armrest plate to the armrest weldment.
8. Repeat STEPS 4-7 for opposite side of the wheelchair.
9. Position armrest plate with joystick mounting holes on desired side of armrest weldment and secure with lug bolt, washers and locknut. Refer to FIGURE 1 for correct hardware orientation.
10. Position armrest plate without joystick mounting holes on opposite side of the armrest weldment and secure with lug bolt, washers and locknut. Refer to FIGURE 1 for correct hardware orientation.

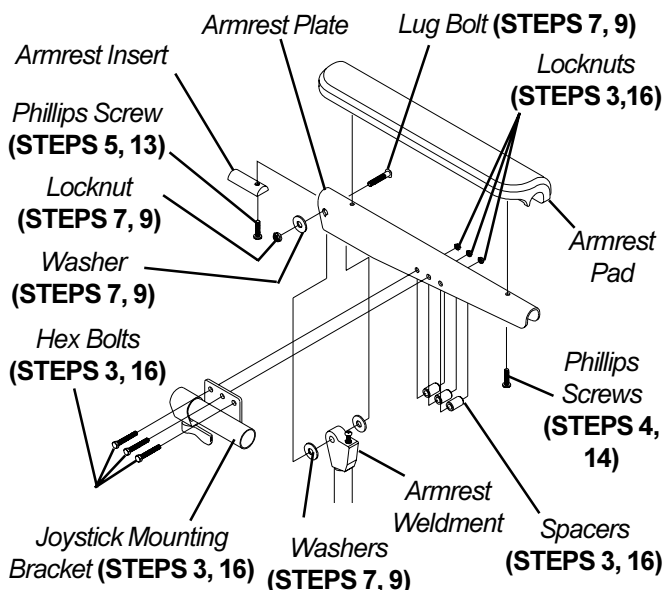


FIGURE 1 - REPOSITIONING MKIV JOYSTICK -  
VAN SEAT MODELS

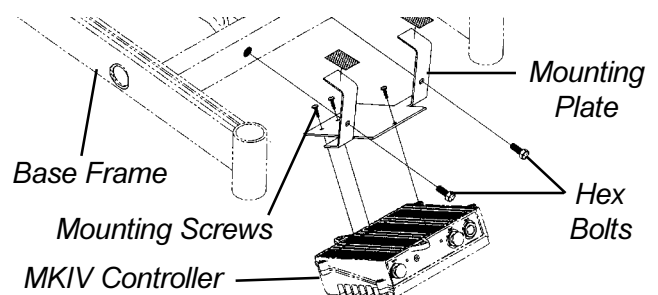
11. Position the armrest pad on the armrest plate.
12. Line up the mounting holes in the armrest insert, armrest plate and armrest pad.
13. Reinstall rear phillips screw through the armrest insert, armrest plate and armrest pad and tighten securely.
14. Reinstall the front phillips screw into the armrest plate and new armrest pad and tighten securely.
15. Repeat STEPS 11-14 for opposite side of wheelchair.
16. Install the three (3) hex bolts, spacers and locknuts that secure the joystick mounting bracket to the armrest plate.
17. Slide the joystick mounting tube through the joystick mounting bracket to the desired position.
18. Secure the adjustment lock to the joystick mounting tube by turning the lever on the adjustment lock.

**REMOVING/INSTALLING MKIV  
CONTROLLER (FIGURE 2)****RWD and MWD Models****REMOVING.**

1. Remove the shroud that covers the MKIV controller.
2. Disconnect the left/right motor leads and battery leads.
3. Remove the two (2) hex bolts that secure the existing MKIV controller to the wheelchair.
4. Remove existing MKIV controller from the wheelchair.
5. Remove the three (3) mounting screws that secure the mounting plate to the MKIV controller.

**INSTALLING.**

1. Install the three (3) mounting screws into the mounting plate and secure to the MKIV controller.
2. Secure the new/existing MKIV controller to the wheelchair with two (2) hex bolts.
3. Connect the left/right motor leads and battery leads
4. Install shroud over the MKIV controller.



NOTE: Controller for gearless/brushless motor removes in the same manner.

FIGURE 2 - REMOVING/INSTALLING MKIV  
CONTROLLER

**Arrow Fwd Model**

**REMOVING.**

1. Remove the front shroud. Refer to REMOVING/INSTALLING FRONT SHROUD in PROCEDURE 17 of this manual.
2. Remove the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in PROCEDURE 17 of this manual.
3. Remove the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
4. Disconnect the joystick cable from the top of the controller.
5. Disconnect the battery wiring harness and controller connection.
6. Remove the two (2) mounting screws, spacers, washers, and locknuts that secure the MKIV controller to the base frame. Set MKIV controller onto ground/floor.
7. Remove the mounting screw and spacer that secure the top of right shock to the base frame.
8. Loosen, DO NOT remove, the mounting screw that secure the bottom of the right shock to the suspension arm.
9. Rotate top of right shock toward inside of the wheelchair.
10. Disconnect right hand motor/controller connection.
11. Rotate top of right shock back into position.
12. Loosely install mounting screw through top of shock and into base frame. DO NOT tighten at this point.
13. To disconnect left hand motor/controller connection, perform STEPS 5-8 for opposite side of controller.

**INSTALLING.**

1. Connect left hand motor/controller connection of NEW controller.
2. Rotate top of left shock into position.
3. Secure top of left shock to base frame with washer and mounting screw. Torque to 360 - inch pounds.
4. Remove mounting screw and washer that secure the top of the right shock to the base frame.
5. Rotate shock toward inside of wheelchair.
6. Connect right hand motor/controller connection.
7. Rotate shock back into position.
8. Secure top of right shock to base frame with washer and mounting screw. Torque to 156 - inch pounds.
9. Torque the bottom mounting screw of each shock to 160 - inch pounds.
10. Secure the MKIV controller to the base frame with the two (2) existing mounting screws, spacers, washers, and locknuts.
11. Connect the joystick cable to the top of the controller.
12. Connect the battery wiring harness and controller connection.
13. Install the battery box(es). Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
14. Install the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in PROCEDURE 17 of this manual.
15. Install the front shroud. Refer to REMOVING/INSTALLING FRONT SHROUD in PROCEDURE 17 of this manual.

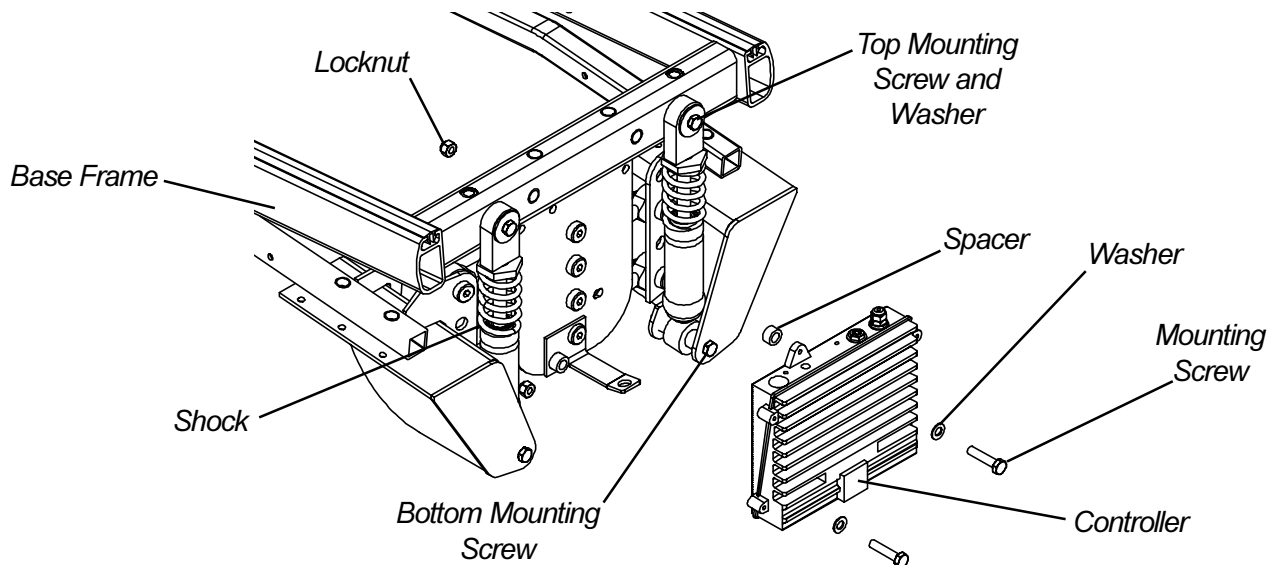


FIGURE 2 - REMOVING/INSTALLING MKIV CONTROLLER - ARROW FWD MODEL

***This Procedure Includes the Following:***

- Positioning Limit Switch***
- Adjusting Limit Switch***
- Replacing Recliner Cable Assemblies***
- Replacing/Adjusting Gas Cylinders***
- Changing Back Height***
- Changing Seat Depth***
- Changing Seat Width***
- Installing/Replacing Adjustable 16 to 19-inch Deep Recliner Seat Frame onto Arrow or X Base***

**WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

**POSITIONING LIMIT SWITCH (FIGURE 1)**

*NOTE: The battery charger connector, as well as, the limit switch are factory set on the RIGHT side of the wheelchair. However, they can be positioned on either side for user convenience. The limit switch MUST BE positioned on the same side as the battery charger connector.*

1. Cut the two (2) tie wraps that secure the limit switch wire to the seat frame.
2. Remove the two (2) mounting screws and washers that secure the actuator to the gas cylinder pivot block.
3. Position actuator on opposite gas cylinder pivot block.

**CAUTION**

DO NOT over tighten the mounting screws that secure the actuator to the pivot block. Damage to actuator will occur.

4. Secure the actuator to the pivot block with the two (2) mounting screws and washers. DO NOT overtighten.
5. Remove the mounting screw that secures the wire retainer to the inside of the seat frame.
6. Remove the two (2) mounting screws and washers that secure the limit switch sensor to the seat frame.
7. Turn limit switch sensor over so opposite side is facing up and the wire is on the INSIDE of the seat frame.
8. Position the limit switch sensor onto the opposite side of the seat frame.

**CAUTION**

DO NOT over tighten the mounting screws that secure the limit switch sensor to the seat frame. Damage to the limit switch sensor will occur.

9. Secure limit switch sensor to the seat frame with the two (2) mounting screws and washers.
10. Secure the wire retainer onto the INSIDE of the seat frame with the mounting screw.
11. Tie wrap the limit switch wire to the seat frame.
12. Adjust the limit switch. Refer to ADJUSTING LIMIT SWITCH in this procedure of the manual.

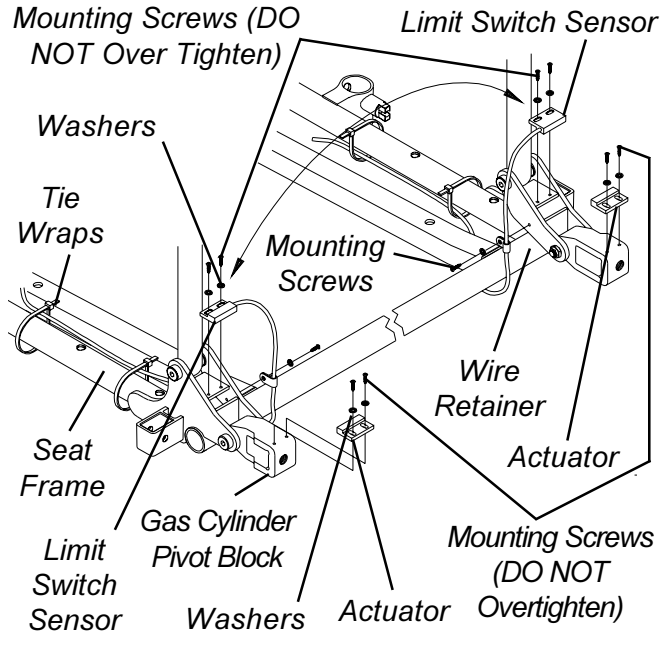


FIGURE 1 - POSITIONING LIMIT SWITCH

**ADJUSTING LIMIT SWITCH (FIGURE 2)**

**WARNING**

NEVER operate the wheelchair while in any recline position over 105° RELATIVE TO THE SEAT FRAME. If the limit switch does not stop the wheelchair from operating in a recline position greater than 105° RELATIVE TO THE SEAT FRAME, do not operate the wheelchair. Adjust the limit switch BEFORE using the wheelchair, otherwise injury or damage can occur.

1. Recline the back of the wheelchair until the gas cylinder rod measures 3-21/32 of an inch.
2. Turn the power of the joystick to the ON position.

*NOTE: ALL segments of the bar graph on the joystick should start to flash on and off and the wheelchair should not operate.*

3. **IF** the wheelchair operates, proceed to the following steps to adjust the actuator on the gas cylinder pivot block:
  - A. Loosen, but do not remove, the two (2) mounting screws and washers that secure the actuator to the gas cylinder pivot block.

- B. Slide actuator UP (towards top of the wheelchair).

**CAUTION**

**DO NOT over tighten the mounting screws that secure the actuator to the pivot block. Damage to the actuator will occur.**

- C. Only tighten the two (2) mounting screws and washers that secure the actuator to the gas cylinder pivot block until the actuator does not move.
- D. Repeat STEPS 1 and 2 until the wheelchair does not operate when the gas cylinder rod is 3-21/32-inch long.

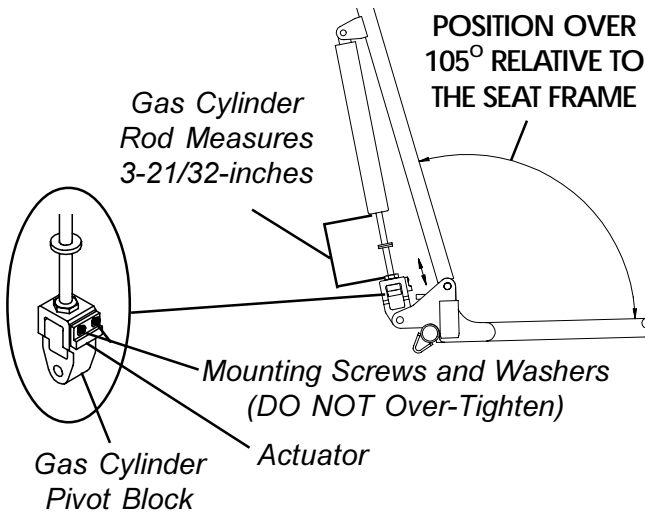


FIGURE 2 - ADJUSTING LIMIT SWITCH

**REPLACING RECLINER CABLE ASSEMBLIES (FIGURE 3)**

NOTE: There are three (3) different cable lengths depending on back height:

CABLE LENGTH	BACK HEIGHT
Short	18-1/2 and 20-inches
Medium	22 and 24-inches
Long	26-inches

**WARNING**

**Replace ONE (1) recliner cable assembly at a time to avoid injury.**

1. Cut the tie wraps that secure the existing recliner cable assembly to the back cane.
2. Remove the pan screw that secures the handle of the existing recliner cable assembly to the back cane.
3. Loosen the jam nut on the gas cylinder rod.
4. Remove the mounting screw, washer, nylon washers and locknut that secure the TOP of the gas cylinder to the mounting bracket on the back cane.
5. Unscrew the gas cylinder from the operator of the existing recliner cable assembly but do not remove the gas cylinder from the pivot block.

6. Remove the operator of the existing recliner cable assembly from the pivot block.
7. Make sure the threads of the gas cylinder rod are flush with the inside of the pivot block.
8. With the operator of the NEW recliner cable assembly on the inside of the recliner seat frame, line up the mounting hole in the operator of the new recliner cable assembly with the gas cylinder rod.

**CAUTION**

**DO NOT force the gas cylinder rod into the operator of the recliner cable assembly.**

**DO NOT cross thread the operator of the recliner cable assembly with the gas cylinder.**

**If slack in the recliner cable or movement in the operator of the cable assembly can not be eliminated, DO NOT use the recliner cable assembly.**

9. Screw the NEW gas cylinder into the operator of the cable assembly until the jam nut sits on the pivot block, there is no slack in the recliner cable and there is no movement in the operator of the recliner cable assembly.

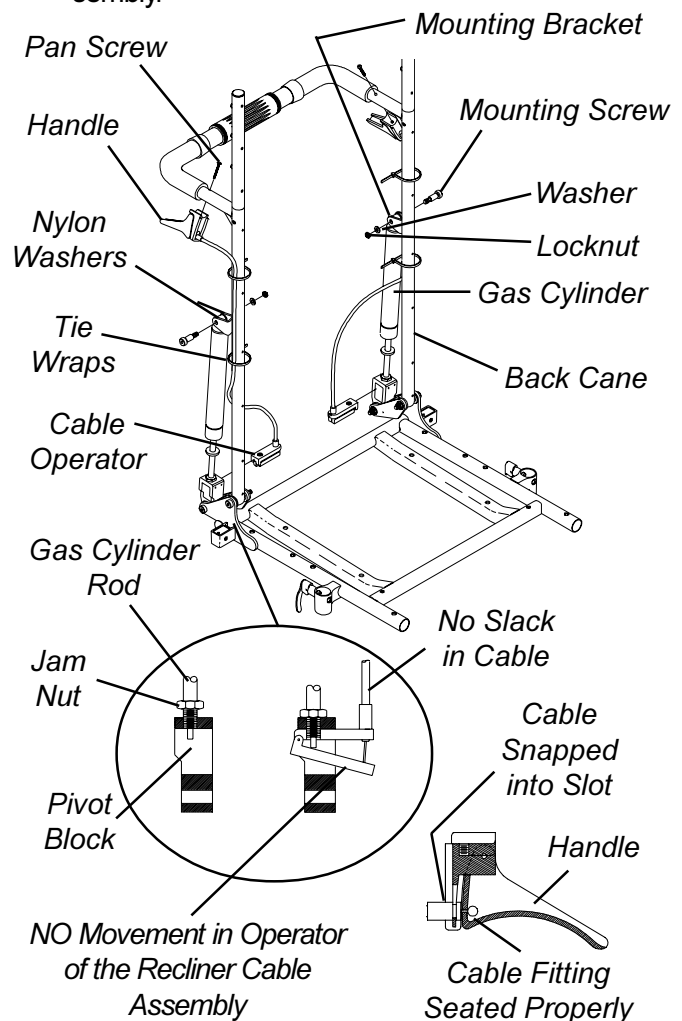


FIGURE 3 - REPLACING RECLINER CABLE ASSEMBLIES



10. Visually inspect the handle to make sure that the cable is snapped completely into slot in handle and cable fitting is seat properly in the handle.
11. Reinstall the mounting screw through the mounting bracket of the back cane, nylon washer, gas cylinder, nylon washer, mounting bracket and washer and securely tighten with the existing locknut. Torque to 75-inch pounds.
12. Line up the mounting hole in the handle of the recliner cable assembly with the mounting hole in the back cane.
13. Insert the pan screw through the handle of the recliner cable assembly and the back cane and torque to 9-inch pounds.
14. Tie wrap the recliner cable assembly to the recliner back cane.
15. Adjust the gas cylinder. Refer to ADJUSTING GAS CYLINDERS in this procedure of the manual.

If slack in the recliner cable or movement in the operator of the cable assembly can not be eliminated, DO NOT use the recliner cable assembly.

6. Screw the NEW gas cylinder into the operator of the cable assembly until the jam nut sits on the pivot block, there is no slack in recliner cable and there is no movement in the operator of the recliner cable assembly.
7. Visually inspect the handle to make sure that the cable is snapped completely into slot in handle and cable fitting is seat properly in the handle.
8. Press the operator of the recliner cable assembly to extend the NEW gas cylinder.
9. Line up the mounting holes of the NEW gas cylinder and the bracket of the back cane.
10. Reinstall the mounting screw through the mounting bracket of the back cane, nylon washer, NEW gas cylinder, nylon washer, mounting bracket and washer and securely tighten with the existing locknut. Torque to 75-inch pounds.
11. Adjust the NEW gas cylinders. Refer to ADJUSTING GAS CYLINDERS in this procedure of the manual.

### REPLACING/ADJUSTING GAS CYLINDERS (FIGURE 4)

#### WARNING

Replace ONE (1) gas cylinder at a time to avoid injury.

Both gas cylinders MUST be operational and adjusted properly BEFORE using the recliner. DO NOT operate the recliner if only one (1) of the gas cylinders is operational or adjusted properly.

#### Replacing Gas Cylinder

1. Remove the mounting screw, washer, nylon washers and locknut that secure the TOP of the gas cylinder to mounting bracket on back cane.
2. Loosen the jam nut on existing gas cylinder rod.
3. Unscrew the existing gas cylinder from the operator of the recliner cable assembly and the pivot block and remove the existing gas cylinder from the wheelchair.
4. Screw cylinder rod of the NEW gas cylinder into the pivot block until the threads of the cylinder rod are flush with inside of pivot block (FIGURE 4).
5. With the operator of the recliner cable assembly on the inside of the recliner seat frame, line up the mounting hole in the operator of the recliner cable assembly with the new gas cylinder rod.

#### CAUTION

DO NOT force the gas cylinder rod into the operator of the recliner cable assembly.

DO NOT cross thread the operator of the recliner cable assembly with the gas cylinder.

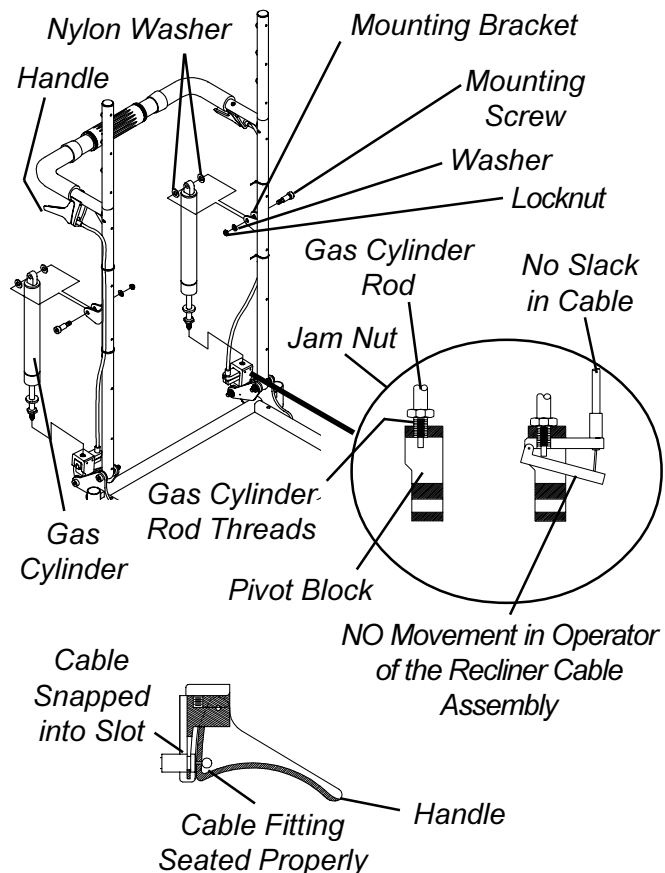


FIGURE 4 - REPLACING/ADJUSTING GAS CYLINDERS

RECLINER

**Adjusting Gas Cylinder**

1. To adjust the **LEFT** gas cylinder: Squeeze the handle of the **RIGHT** recliner cable assembly and try to recline the back. The back should not recline.
2. If the **LEFT** side of the back releases without squeezing the handle of the **LEFT** recliner cable assembly, perform the following steps:
  - A. Finger tighten the jam nut on the rod of the gas cylinder until it bottoms out on the rod of the cylinder (**FIGURE 4**).
  - B. Turn the jam nut on the **LEFT** gas cylinder **COUNTERCLOCKWISE** approximately one-half (1/2) revolution.
3. To adjust the **RIGHT** gas cylinder: Repeat **STEPS 1** and **2** for the **LEFT** handle of the cable assembly.

*NOTE: The gas cylinder rod will turn.*

- C. Repeat **STEP 1**.
- D. Repeat **STEP B** until the **LEFT** side of the back **DOES NOT** recline.

**CAUTION**

Damage to the gas cylinder rod **WILL** occur if the following steps are **NOT** followed when the jam nut is torqued against the pivot block.

4. Using **NO LARGER** than 1/4-inch wide, fine toothed pliers, wrap masking tape around the teeth of the pliers two (2) or (3) revolutions.
5. Using **NO** excessive force, hold the gas cylinder rod just above the jam nut.
6. While holding the gas cylinder rod and using a 17mm wrench, turn the jam nut **CLOCKWISE** and torque the **RIGHT** and **LEFT** jam nuts against the **RIGHT** and **LEFT** pivot blocks to 156-inch pounds.

**CHANGING BACK HEIGHT (FIGURE 5)**

1. Press the push pins on the headrest extension tubes in and remove headrest extension from back canes.
2. Remove the recliner cables from the back canes. Refer to REPLACING RECLINER CABLE ASSEMBLIES in this procedure of the manual.
3. Remove the mounting screws, washers and locknuts that secure the **TOP** of the gas cylinders to the mounting bracket on the back canes.
4. Remove the mounting screws, washers and locknuts that secure the back canes to the seat frame.
5. Remove the existing recliner back assembly from the wheelchair.

6. Turn the spreader bar on the existing back canes **CLOCKWISE** (toward back upholstery) and remove the spreader bar from the existing back canes.
7. Loosely install the spreader bar onto the **NEW** back cane handles by rotating the spreader bar **COUNTERCLOCKWISE** (away from the back canes).

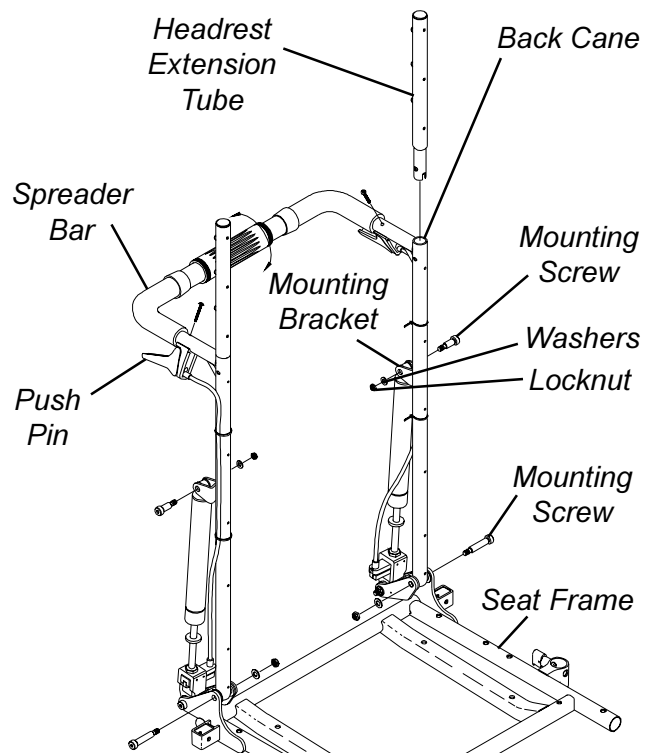
*NOTE: If the spreader bar does not thread onto the back canes, do not force. Turn the spreader bar around and repeat STEP 7.*

8. Line up two (2) bottom mounting holes of back canes with the two (2) mounting holes in the seat frame.

**WARNING**

The back canes **MUST** be fastened securely to the seat frame **BEFORE** using the wheelchair. Torque mounting screws to 156-inch pounds.

9. Reinstall the mounting screw, washer and locknut through the back cane and seat frame mounting holes and torque to 156-inch pounds.
10. Reinstall the mounting screw through the mounting bracket of the back cane, nylon washer, mounting hole in the **TOP** of the gas cylinder, nylon washer, mounting bracket and washer and securely tighten with the existing locknut. Torque to 75-inch pounds.
11. Reinstall the recliner cable assemblies onto the back canes. Refer to REPLACING RECLINER CABLES in this procedure of the manual.



*NOTE: Upholstery not shown for clarity.*

**FIGURE 5 - CHANGING BACK HEIGHT**

NOTE: There are three (3) different cable lengths depending on back height:

BACK HEIGHT (in inches)	18-1/2, 20	22, 24	26
CABLE LENGTH	Short	Medium	Long

NOTE: New recliner cables will be needed if back height is changed to a height not within the length of the original cable.

12. Install the NEW back upholstery onto the back canes.
13. Install the ten (10) or twelve (12) mounting screws (depending on back height) that secure the back upholstery to the recliner back canes.
14. Reinstall headrest extension onto recliner back canes.
15. Adjust the tautness of the back and headrest upholstery. Refer to ADJUSTING BACK OR HEADREST UPHOLSTERY in this procedure of the manual.

### CHANGING SEAT DEPTH (FIGURE 6)

NOTE: 16-inch, 17-inch, 18-inch or 19-inch seat depths CAN NOT be increased to 20-inches or deeper. If needing to increase to a seat depth of 20-inches or deeper, the base frame MUST be converted from a STANDARD base frame to a LONG base frame as well.

NOTE: 20-inch, 21-inch or 22-inch seat depths CAN NOT be decreased to 19-inches or less. If needing to decrease to a seat depth of 19-inches or less, the base frame MUST be converted from a LONG base frame to a STANDARD base frame.

To adjust seat depth of wheelchair, use following guidelines:

If the current seat depth is an ODD number, i.e., 17-inches, 19-inches or 21-inches, the seat depth CANNOT be INCREASED without changing the seat frame. Refer to INSTALLING/REPLACING ADJUSTABLE 16 TO 19-INCH DEEP RECLINER SEAT FRAME ONTO ARROW OR X BASE FRAMES in this procedure of the manual.

If the current seat depth is an ODD number, i.e., 17-inches, 19-inches or 21-inches, the seat depth can be DECREASED by 1-inch by installing a 1-inch shorter seat pan. Refer to the following procedures:

If the current seat depth is an EVEN number, i.e., \*16-inches, 18-inches, 20-inches or 22-inches, the seat depth CANNOT be DECREASED without changing the seat frame. Refer to INSTALLING/REPLACING ADJUSTABLE 16 TO 19-INCH DEEP RECLINER SEAT FRAME ONTO ARROW OR X BASE FRAME in this procedure of the manual.

\*NOTE: 16-inch seat depth is the smallest seat depth available on recliner seat frames.

If the current seat depth is an EVEN number, i.e., 16-inches, 18-inches, 20-inches or \*22-inches, the seat depth can be INCREASED by 1-inch by installing a 1-inch deeper seat pan. Refer to the following procedures:

\*NOTE: 22-inch seat depth is the deepest seat depth available on recliner seat frames.

### Seat Pan Removal/Replacement Procedures:

1. Remove the seat cushion from the wheelchair.
2. Remove the six (6) mounting screws and locknuts that secure seat pan, seat positioning strap to the seat frame.
3. Install new 1-inch deeper/shorter seat pan onto seat frame.
4. Reinstall the mounting screws, spacers and locknuts and torque to 75-inch pounds.
5. Remove the protective strips on the seat pan and reinstall the seat cushion onto the seat pan.

NOTE: Clean upholstery with a warm damp cloth and mild detergent to remove superficial soil.

**WARNING**

Laundrying or moisture will reduce the flame retardation of the upholstery.

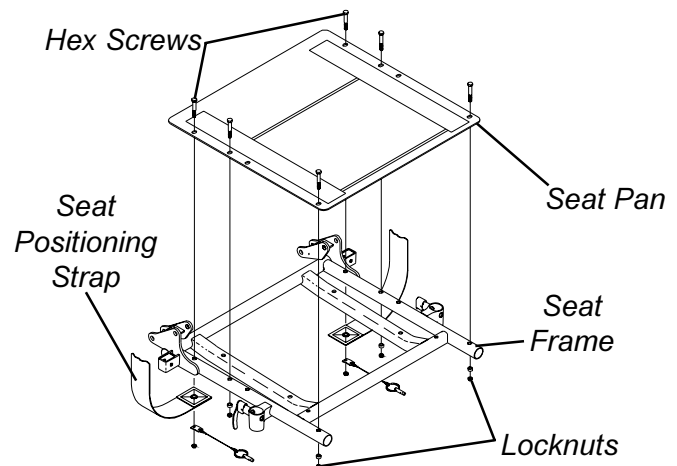


FIGURE 6 - CHANGING SEAT DEPTH

### CHANGING SEAT WIDTH

To change seat width, the seat frame must be changed to the desired width. Refer to INSTALLING/REPLACING ADJUSTABLE 16 TO 19-INCH DEEP RECLINER SEAT FRAME ONTO ARROW OR X BASE FRAME in this procedure of the manual.

NOTE: If changing the seat width of the wheelchair, the back and headrest upholstery, seat pan and cushion also need to be changed.

NOTE: If changing the seat width of the wheelchair, the back canes, spreader bar and headrest pillow may also need to be changed. Refer to the following charts:

BACK CANES AND SPREADER BAR SEAT WIDTH RANGES

14-17-INCHES                      OR                      18-24-INCHES

HEADREST PILLOWS SEAT WIDTH RANGES (IN INCHES)

14-15, 16-18, 19-20 OR 21-24

If the seat width required is within the range of the original back canes, spreader bar and headrest pillow, the original components can still be used.

If the seat width required is NOT within the range of the original back canes, spreader bar and headrest pillow, the original components can not be used.

**EQUIPMENT OPTION**

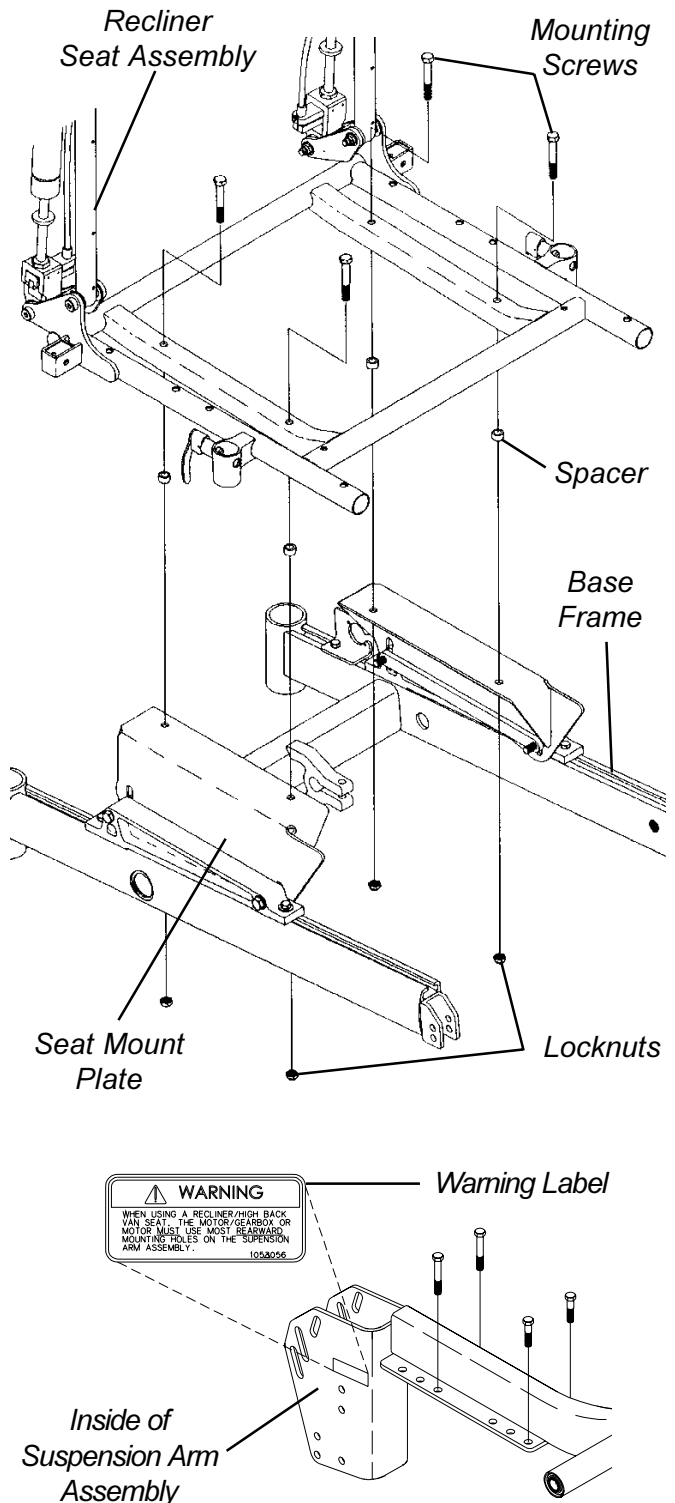
**INSTALLING/REPLACING ADJUSTABLE 16 TO 19-INCH DEEP RECLINER SEAT FRAME ONTO ARROW OR X BASE FRAME (FIGURE 7)**

1. Perform instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual.
2. Perform one (1) of the following in **PROCEDURE 7** of this manual:
  - A. Remove standard seat frame subassembly. Refer to REMOVING/INSTALLING STANDARD SEAT FRAME SUBASSEMBLY.
  - B. Remove adjustable seat frame subassembly. Refer to INSTALLING/REMOVING ADJUSTABLE SEAT FRAME ASSEMBLY AND OR COMPONENT REPLACEMENT.
  - C. Remove captains van seat. Refer to INSTALLING/REMOVING CAPTAINS VAN SEAT ASSEMBLY.
3. Remove seat pan on recliner.
4. Install new recliner seat assembly onto seat mount plates.
5. Secure recliner seat assembly to seat mount plates with the mounting screws, spacers and locknuts. Torque the mounting screws to 156-inch pounds.

*NOTE: There are three (3) types of seat mount plates; low, medium, and high heights. The seat mount plate shown in this illustration represents the medium height. Refer to MOUNTING PLATE - SEAT ANGLE ADJUSTMENT AND INSTALLATION ORIENTATION in PROCEDURE 6 of this manual for illustrations of the low and high heights.*

6. Position limit switch onto wheelchair. Refer to POSITIONING LIMIT SWITCH in this procedure of the manual.
7. Reinstall recliner seat pan with existing six (6) mounting screws.
8. Install the two (2) warnings labels onto the two (2) suspension arm assemblies. Refer to FIGURE 7 for correct label placement.
9. Install battery box(es). Refer to INSTALLING/REMOVING BATTERY BOXES- GROUP 24 BATTERY BASE FRAMES or INSTALLING/REMOVING BATTERY BOX - GROUP 22 BATTERY BASE FRAMES in PROCEDURE 9 of this manual.

10. Perform instructions outlined in PREPARATIONS FOR REMOVING/INSTALLING SEAT FRAME (STANDARD FRAME, ADJUSTABLE FRAME, AND CAPTAINS VAN SEAT) in PROCEDURE 6 of this manual:



**FIGURE 7 - INSTALLING/REPLACING ADJUSTABLE 16 TO 19-INCH DEEP RECLINER SEAT FRAME ONTO ARROW OR X BASE**

<p><b><i>This Procedure includes the following:</i></b></p> <p><b><i>Removing/Installing Group 24 Battery Box Sub-Frame</i></b></p> <p><b><i>Removing/Installing Group 22 Battery Box Tray</i></b></p> <p><b><i>Converting Group 22 Batteries To Group 24 Batteries</i></b></p> <p><b><i>Shock Replacement</i></b></p> <p><b><i>Shock Spring Replacement</i></b></p> <p><b><i>Replacing Stabilizer Fork Assembly</i></b></p> <p><b><i>Replacing Stabilizer Wheels</i></b></p> <p><b><i>Replacing Stabilizer Cylinder Springs</i></b></p> <p><b><i>Adjusting Weight Distribution</i></b></p> <p><b><i>Adjusting Stabilizers</i></b></p> <p><b><i>Installing/Removing Gearbox</i></b></p> <p><b><i>Replacing Suspension Arm</i></b></p>
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**WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

**REMOVING/INSTALLING GROUP 24 BATTERY BOX SUB-FRAME (FIGURE 1)**

**Removing**

1. Remove the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
2. Remove the two (2) mounting screws and locknuts that secure the wiring harness w/bracket and the rear of the existing sub-frame to the base frame. Refer to REMOVING/INSTALLING WIRING HARNESS in PROCEDURE 10 of this manual.
3. Remove the four (4) mounting screws that secure the shocks, retainer bar, spacers and retainer clips to the base frame. Refer to REPLACING BATTERY BOX RETAINER/RETAINER CLIP - GROUP 24 BATTERY BASE FRAMES in PROCEDURE 11 of this manual.
4. Remove the existing sub-frame assembly.

**Installing**

1. Install the two (2) mounting screws and locknuts that secure the wiring harness w/bracket and the back of the NEW sub-frame to the base frame. Refer to REMOVING/INSTALLING THE WIRING HARNESS in PROCEDURE 10 of this manual. Use Loctite 242 and torque mounting screws to 160-inch pounds.

2. Reinstall the four (4) mounting screws that secure the shocks, retainer bar, spacers and retainer clips to the base frame. Refer to REPLACING BATTERY BOX RETAINER/RETAINER CLIP - GROUP 24 BATTERY BASE FRAMES in PROCEDURE 11 of this manual. Use Loctite 242 and torque mounting screws to 160-inch pounds.
3. Reinstall the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual. Use Loctite 242 and torque mounting screws to 160-inch pounds.

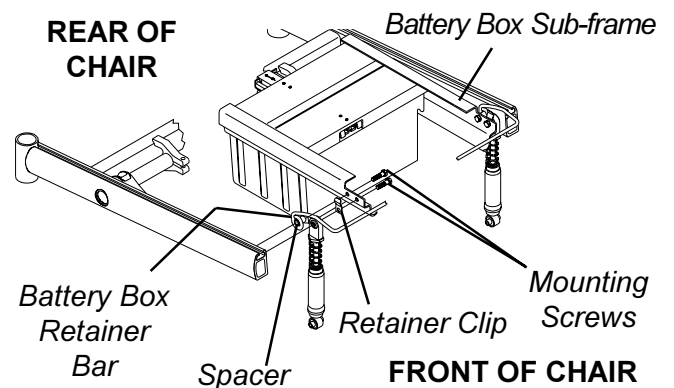
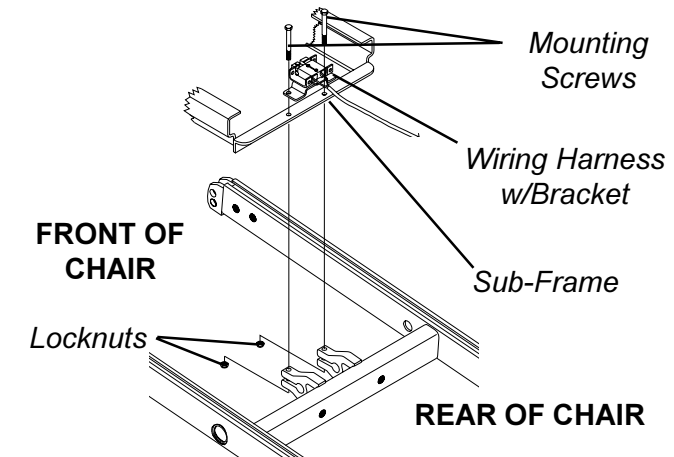


FIGURE 1 - REMOVING/INSTALLING GROUP 24 BATTERY BOX SUB-FRAME

**REMOVING/INSTALLING GROUP 22 BATTERY BOX TRAY (FIGURE 2)**

**Removing**

1. Remove battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.
2. Remove the two (2) mounting screws and locknuts that secure rear of battery box tray to the base frame.
3. Remove the two (2) front locknuts that secure the battery box tray to battery mount brackets.
4. Remove the battery box tray.

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**Installing**

1. Install battery box tray onto base frame.
2. Secure the front of the battery box tray to battery mount brackets with existing locknuts. Torque to 160-inch pounds.
3. Secure the rear of the battery box tray to the base frame with existing mounting screws and locknuts. Torque to 160-inch pounds.
4. Reinstall the battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.

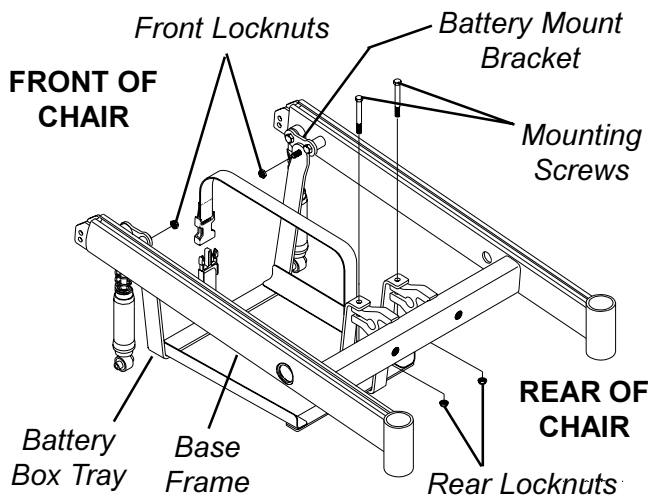
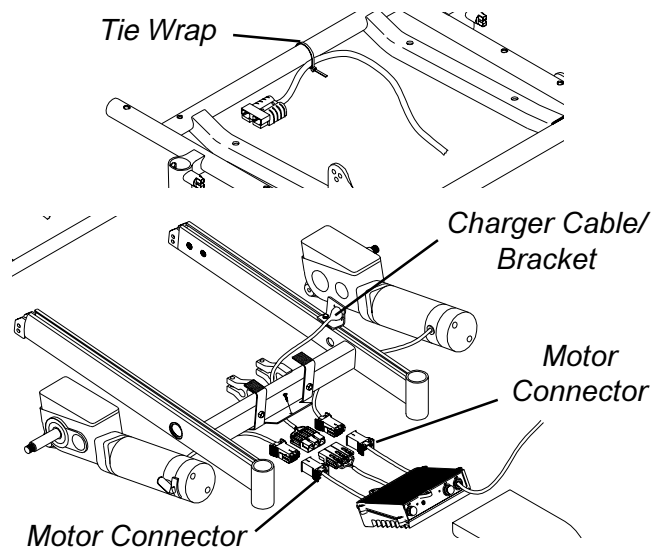


FIGURE 2 - REMOVING/INSTALLING GROUP 22 BATTERY BOX TRAY

3. Disconnect the right and left motor connectors from the controller connectors.
4. Remove the two (2) mounting screws that secure the charger cable to the mount bracket.
5. Remove the charger cable from the mount bracket.
5. Cut the tie-wrap that secures the wiring harness to the seat frame.
6. Remove the wiring harness.
7. Remove the four (4) mounting screws that secure the battery mount brackets to the base frame and remove the battery mount brackets.



**EQUIPMENT OPTION**

**CONVERTING GROUP 22 BATTERY BOX TRAY TO GROUP 24 BATTERY BOX SUB FRAME**

*NOTE: The battery box tray and battery mount brackets will not be used with this option. Keep for future use.*

**Removing Group 22 Components (FIGURE 3)**

1. Remove the battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.
2. Remove the existing battery box tray. Refer to REMOVING/INSTALLING THE GROUP 22 BATTERY BOX TRAY in this procedure of the manual.

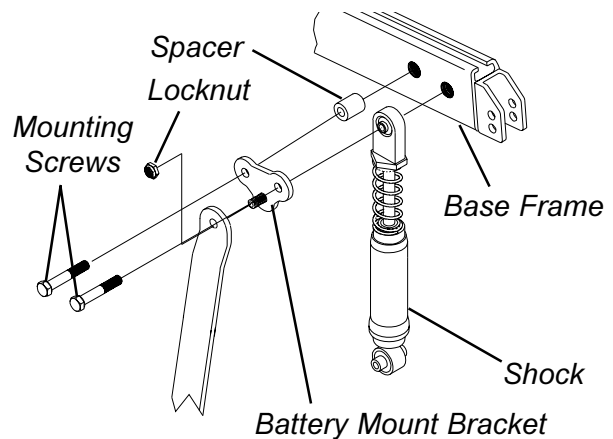


FIGURE 3 - REMOVING GROUP 22 COMPONENTS

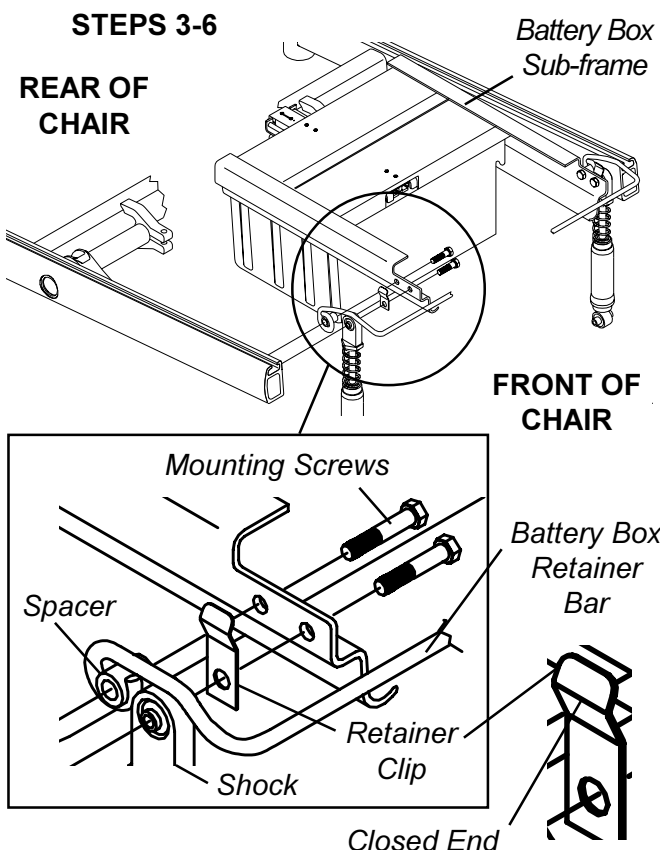
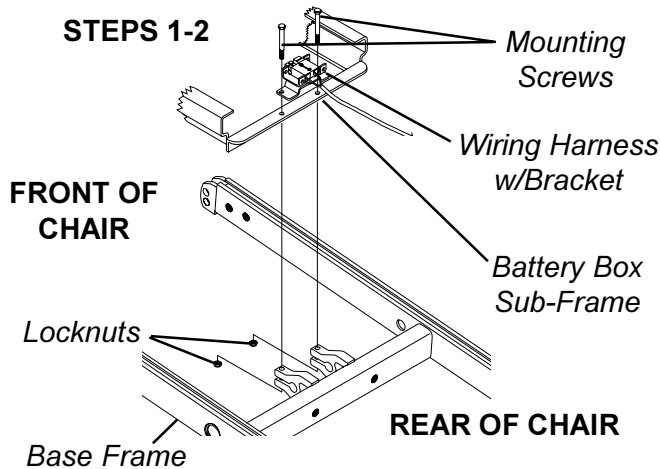
**Installing Group 24 Components (FIGURE 4)**

1. Align the mounting holes of the NEW wiring harness w/bracket, the NEW battery box sub-frame and the mounting holes in the base frame.
2. Install the two (2) mounting screws through all three (3) parts and secure with locknuts. Torque to 160-inch pounds.

**WARNING**

The Battery Box Retainer/Retainer Clip **MUST** be fastened securely in place before using the wheelchair. Use Loctite 242 and torque to 160-inch pounds.

- Position the NEW retainer clip between the NEW battery box sub-frame and shock making sure the retainer clip mounting hole is towards the bottom and the closed end of the clip is against the battery box retainer bar.



- Install the mounting screw that secures the retainer clip to the battery box sub-frame. Use Loctite 242 and torque to 160-inch pounds.
- Align the NEW battery box retainer and spacers with the mounting holes in the base frame making sure the closed end of the battery box retainer is pointing up.
- Reinstall the mounting screws that secure the battery box retainer to the base frame. Use Loctite 242 and torque to 160-inch pounds.
- Install charger cable to existing mounting bracket secure with existing two (2) mounting screws.
- Tie-wrap NEW wiring harness to the seat frame.
- Connect the following cables:**
  - The right and left motor connectors to the controller connectors.
  - The battery harness/charger cable (BLUE) to the controller connector (BLUE).
- Install the NEW battery boxes. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.

**SHOCK REPLACEMENT**

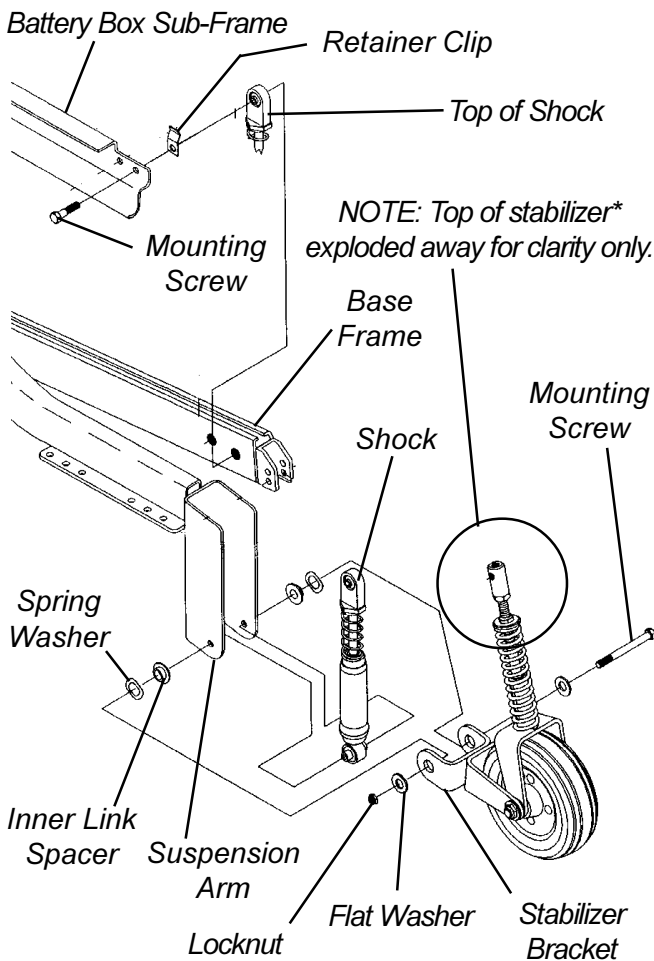
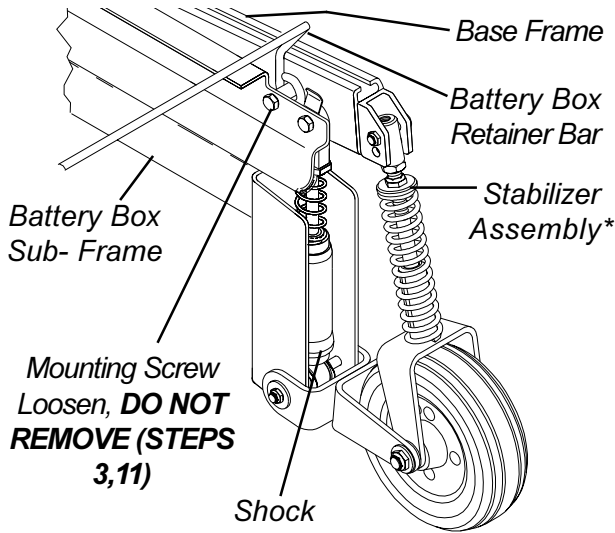
**Group 24 Battery Base Frames (FIGURE 5)**

- Remove the front battery box. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
  - Remove the drive wheel assembly. Refer to REMOVING/INSTALLING THE DRIVE WHEEL in PROCEDURE 12 of this manual.
  - Loosen the mounting screw that secures the battery box retainer between the battery box sub frame assembly and the base frame.
  - Remove the mounting screw that secures the top of the shock and retainer clip between the battery box sub frame assembly and the base frame.
- NOTE: Remove and hold onto the retainer clip for installation of the NEW shock.*
- Remove the mounting screw, two (2) flat washers, two (2) spring washers, two (2) inner link spacers, and locknut that secures the bottom of the shock, suspension arm, and stabilizer bracket together.
  - Remove the existing shock.
  - Install the NEW shock.

FIGURE 4 - INSTALLING GROUP 24 COMPONENTS

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- Secure the bottom of the NEW shock, suspension arm, and stabilizer bracket together with the mounting screw, two (2) flat washers, two (2) spring washers, two (2) inner link spacers, and locknut. Torque to 160-inch pounds.



NOTE: The spacer and retainer are not shown for clarity.

\*NOTE: The spring shown on the stabilizer is for wheelchair models built before 7/1/1999

FIGURE 5 - SHOCK REPLACEMENT - GROUP 24 BATTERY BASE FRAMES

**WARNING**

The Battery Box Retainer/Retainer Clip **MUST** be fastened securely in place before using the wheelchair. Use Loctite 242 and torque to 160-inch pounds.

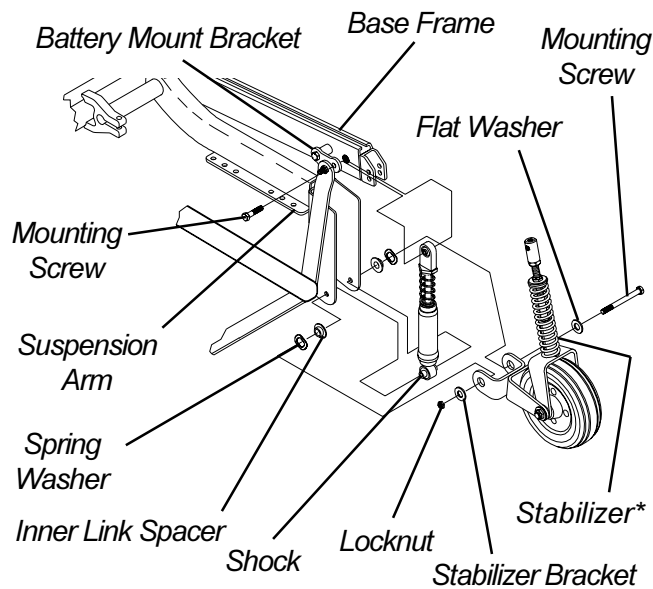
- Position retainer clip between shock and battery box sub-frame making sure the retainer clip mounting hole is towards the bottom and the closed end of clip is against battery box retainer.
- Secure top of shock and retainer clip between battery box sub frame and base frame. Apply Loctite 242 and torque to 160-inch pounds.
- Apply Loctite 242 and torque the mounting screw that secures the battery box retainer between the battery box sub frame and base frame. Torque to 160-inch pounds.
- Reassemble large wheel to hub assembly and Torque to 160-inch pounds.
- Repeat this procedure for the opposite shock.
- Reinstall the front battery box. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.

**Group 22 Battery Base Frames (FIGURE 6)**

- Remove the battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.
- Remove the four (4) nuts that secure the large wheel assembly to the to the hub assembly and remove the large wheel assembly.
- Loosen the mounting screw that secures the spacer between battery mount bracket and the base frame.
- Remove mounting screw that secures top of the shock between battery mount bracket and base frame.
- Remove the mounting screw, two (2) flat washers, two (2) spring washers, two (2) inner link spacers, and locknut that secures the bottom of the shock, suspension arm, and stabilizer bracket together.
- Remove the existing shock.
- Install the NEW shock.
- Secure the bottom of the NEW shock, suspension arm, and stabilizer bracket together with the mounting screw, two (2) flat washers, two (2) spring washers, two (2) inner link spacers, and locknut. Torque to 160-inch pounds.
- Secure the top of shock between battery mount bracket and base frame. Apply Loctite 242 and torque to 160-inch pounds.



10. Apply Loctite 242 and torque the mounting screw that secures the spacer between the battery mount bracket and base frame. Torque to 160-inch pounds.
11. Reassemble large wheel to hub assembly and Torque to 160-inch pounds.
12. Repeat this procedure for the opposite shock.
13. Reinstall the battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.



NOTE: Top of stabilizer exploded away for clarity only.

\*NOTE: The spring shown on the stabilizer is for wheelchair models built before 7/1/1999

FIGURE 6 - SHOCK REPLACEMENT - GROUP 22 BATTERY BASE FRAMES

## SHOCK SPRING REPLACEMENT (FIGURE 7)

NOTE: Heavy Duty Models Only. Shock springs on standard models cannot be individually replaced. A new shock assembly must be installed. Refer to SHOCK REPLACEMENT in this procedure of the manual.

1. Remove the front battery box. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.
  2. Perform one (1) of the following:
    - A. **(Group 24 Battery Base Frames)** Loosen the mounting screw that secures the battery box retainer between the battery box sub frame assembly and the base frame.
    - B. **(Group 22 Battery Base Frames)** Loosen the mounting screw that secures the battery box spacer between the battery box tray mount bracket and the base frame.
  3. Remove the mounting screw that secures the top of the stabilizer cylinder to the base frame.
  4. Perform one (1) of the following:
    - A. **(Group 24 Battery Base Frames)** Remove the mounting screw that secures the top of the shock between the battery box sub-frame and the base frame.
    - B. **(Group 22 Battery Base Frames)** Remove the mounting screw that secures the top of the shock between retainer clip and the battery box tray mount bracket and the base frame.
- NOTE: **(Group 24 Battery Base Frames Only)** Remove and hold onto the retainer clip for reinstallation of shock.
5. Swing the top of both the stabilizer cylinder and the shock forward.
  6. Hold the spring retainer and turn the shock eyelet assembly **COUNTERCLOCKWISE** to unthread it from the shock.
  7. Remove the spring retainer and spring.
  8. Place the NEW spring onto the shock.
  9. Reinstall the shock eyelet assembly and the spring retainer onto the NEW spring.
  10. While holding the spring retainer, torque the shock eyelet assembly to 245-inch pounds.
  11. **(Group 24 Battery Base Frames)** Position the retainer clip between the shock and the battery box sub-frame making sure the retainer clip mounting hole is towards the bottom and the closed end of the clip is against the battery box retainer.
  12. Perform one (1) of the following:
    - A. **(Group 24 Battery Base Frames)** Apply Loctite 242 and torque the mounting screw that secures the battery box retainer to the base frame to 160-inch pounds.
    - B. **(Group 22 Battery Base Frames)** Apply Loctite 242 and torque the mounting screw that secures the battery mount bracket to the base frame to 160-inch pounds.
  13. Secure the top of the shock and retainer clip (Group 24) to base frame. Apply Loctite 242 and torque to 160-inch pounds.

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14. Reinstall the front battery box. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES or INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.

2. Remove the mounting screw, two (2) washers, two (2) spring washers, two (2) outer link spacers, two (2) flat washers, and locknut that secure the stabilizer fork assembly, stabilizer bracket, and stabilizer wheel together.
3. Secure NEW stabilizer fork assembly to stabilizer bracket and stabilizer wheel with existing mounting screw, two (2) washers, two (2) spring washers, two (2) outer link spacers, two (2) flat washers, and locknut. Securely tighten.
4. Secure top of stabilizer fork assembly to base frame with existing mounting screw and locknut. Torque to 40 in/lbs.

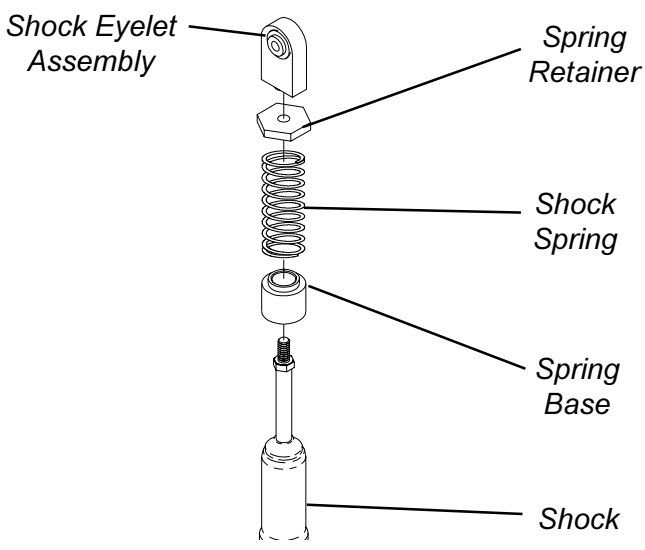


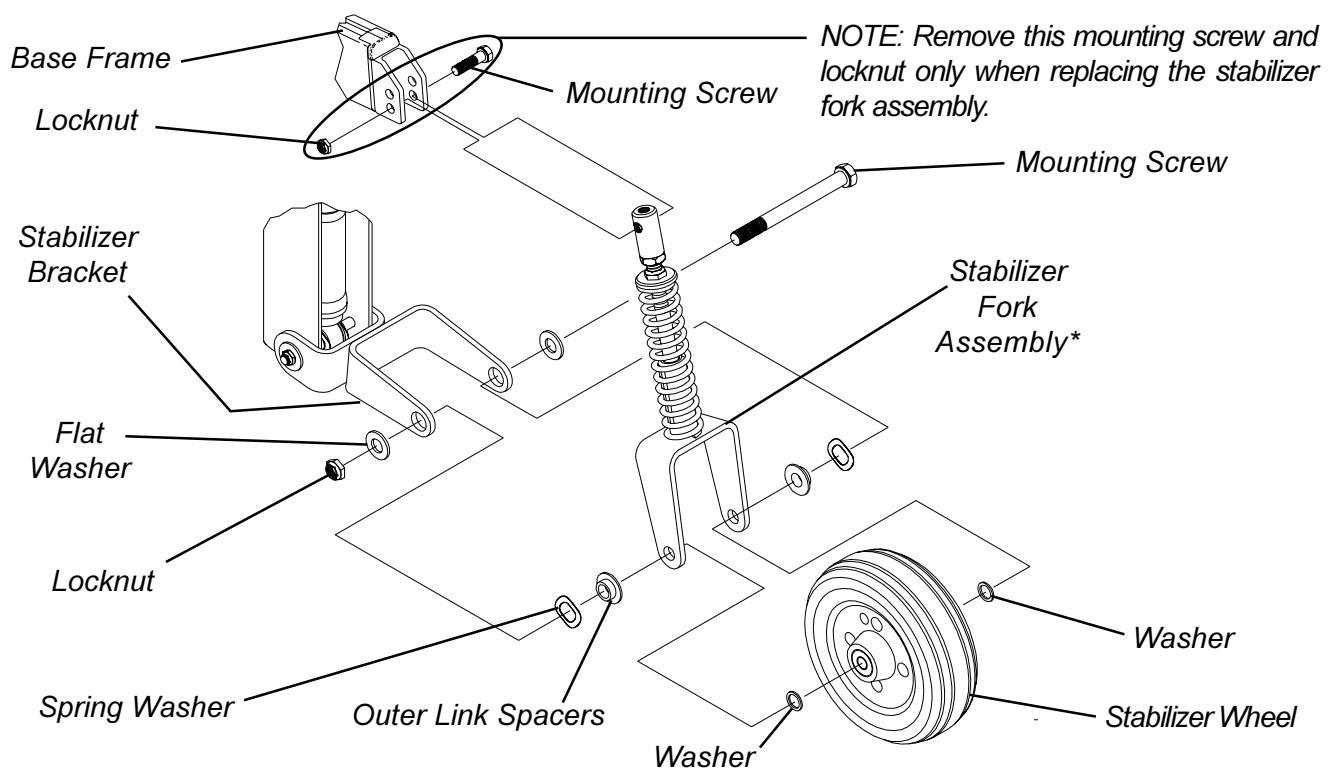
FIGURE 7 - SHOCK SPRING REPLACEMENT

**REPLACING STABILIZER FORK ASSEMBLY (FIGURE 8)**

1. Remove the mounting screw and locknut that secures the top of the stabilizer fork assembly to the base frame.

**REPLACING STABILIZER WHEELS (FIGURE 8)**

1. Remove the mounting screw, two (2) washers, two (2) spring washers, two (2) outer link spacers, two (2) flat washers, and locknut that secure the stabilizer wheel, stabilizer bracket, and stabilizer fork assembly together.
2. Secure NEW stabilizer wheel to stabilizer bracket and stabilizer fork assembly with existing mounting screw, two (2) washers, two (2) spring washers, two (2) outer link spacers, two (2) flat washers, and locknut. Securely tighten.



\*NOTE: The spring shown on the stabilizer fork assembly is for wheelchair models built before 7/1/1999

FIGURE 8 - REPLACING STABILIZER FORK ASSEMBLY/REPLACING STABILIZER WHEELS

## REPLACING STABILIZER CYLINDER SPRING (FIGURE 9)

*NOTE: Stabilizer springs are only on wheelchair models built before 7/1/1999.*

1. Remove mounting screw and locknut that secures top of the stabilizer fork assembly to the base frame.
2. Unthread adjustment barrel and remove from stabilizer rod.
3. Unthread jam nut and remove from stabilizer rod.
4. Unthread adjustment nut and remove from stabilizer rod.
5. Remove spring retainer from stabilizer rod.
6. Remove existing stabilizer spring.
7. Install NEW stabilizer spring.
8. Reinstall spring retainer.
9. Reinstall adjustment nut.
10. Reinstall jam nut.
11. Reinstall adjustment barrel.
12. Adjust stabilizer. Refer to ADJUSTING STABILIZERS in this procedure of the manual.

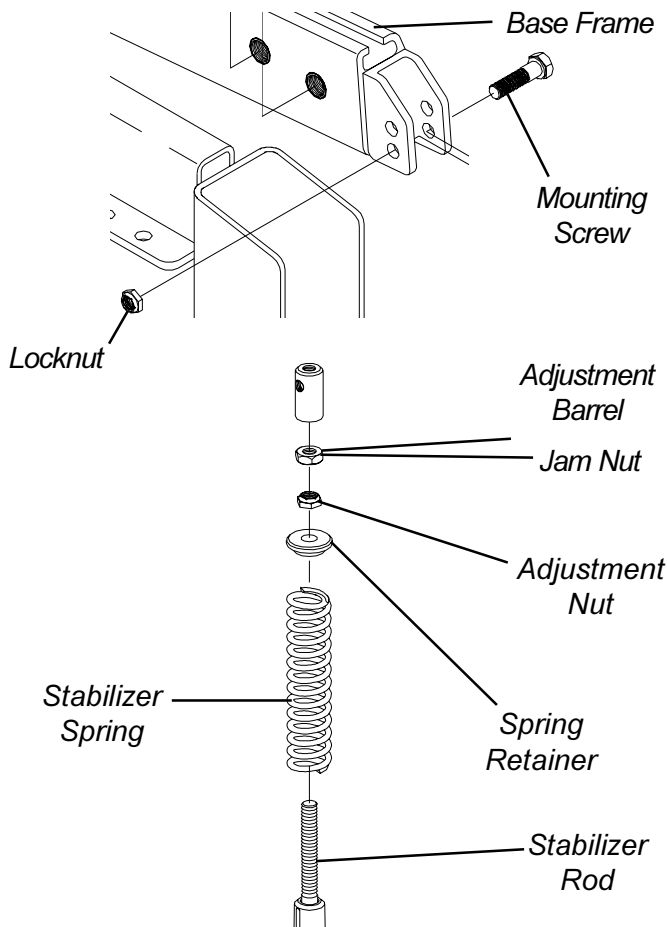


FIGURE 9 - REPLACING STABILIZER CYLINDER SPRING

## ADJUSTING WEIGHT DISTRIBUTION (FIGURE 10)

*NOTE: The seat mount plates and seat support brackets allow seat frame to be repositioned along the base frame.*

*NOTE: The position of the seat support brackets is factory set at 5-1/2-inches from the front end of the base frame. Use the following chart as a starting point.*

Weight of User	Distance of Seat Support Bracket*
under 200-lbs	5-7-inches
over 200-lbs	6-8-inches

\* Distance measured from the front of the base frame to the front of the seat support bracket.

*NOTE: Following the above chart will put 85-90% of the total weight of the chair and user over the large wheels. However, these settings may not be the most desirable in terms of maneuverability and comfort for the user.*

### Adjustment for Optimum Performance

1. Loosen the four (4) mounting screws that secure the seat support brackets to the base frame.
2. Adjust seat back until one (1) of the following occurs:
  - A. The clearance of the front riggings and the stabilizers is at a minimum or
  - B. The rear stop is contacted.

**WARNING**  
DO NOT adjust seat beyond limit stops.

3. Retighten mounting screws securing the seat support brackets to the base frame.
4. Test wheelchair for handling.
5. If handling of the power wheelchair is drifting, repeat this procedure moving seat up in small increments until the chair handles properly.
6. Once the seat is adjusted to the point of proper handling, comfort adjustments can be made
7. Check distance the stabilizer wheels are off the floor.
  - A. If distance is between 3/8 and 1/2-inches off of the floor the user will experience a "normal" amount of rocking when stopping or negotiating steeper inclines, depending on the amount of braking.
  - B. If distance is greater than 1/2-inches off of floor the amount of rocking the user experiences when stopping or negotiating steeper inclines will increase.

*NOTE: This setting would allow the wheelchair to roll better on thicker carpeting and minimize scuffing.*

- C. If distance is between 0 and 3/8-inch, along with an increase in spring compression, the amount of rocking the user experiences will decrease. Although, this setting would minimize rocking, obstacles protruding from the ground as well as negotiating steeper inclines will be more difficult.
- 8. Adjust the stabilizers to the desired setting determined in STEP 7. Refer to ADJUSTING STABILIZERS in this procedure of the manual.

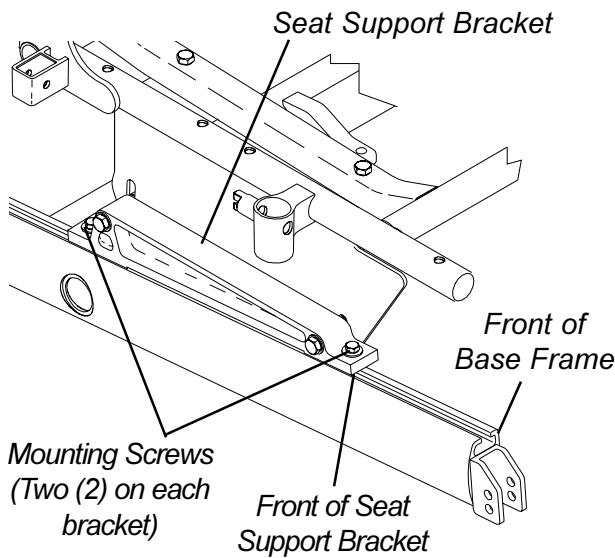


FIGURE 10 -ADJUSTING WEIGHT DISTRIBUTION

**ADJUSTING STABILIZERS (FIGURE 11)**

*NOTE: Adjust the stabilizers to the desired handling/maneuverability determined in ADJUSTING WEIGHT DISTRIBUTION in this procedure of the manual.*

*NOTE: Note the mounting position of the stabilizer to the base frame for proper reinstallation.*

**Height Adjustment**

- 1. Remove the mounting screw and locknut that secures the top of the stabilizer fork assembly to the base frame.
- 2. Swing top end of stabilizer fork assembly forward.
- 3. Loosen jam nut, located below adjustment barrel.
- 4. Perform one (1) of the following:  
 Turn the adjustment barrel **CLOCKWISE** to raise the stabilizer wheel.  
 Turn the adjustment barrel **COUNTERCLOCKWISE** to lower the stabilizer wheel.

**WARNING**

The threaded rod must be engaged in the adjustment barrel at least eight (8) full threads. Otherwise, injury or damage may occur.

- 5. Realign the top of stabilizer fork assembly with the mounting hole in the base frame noted earlier.

*NOTE: Further height adjustment can be accomplished by using the alternate mounting hole in the base frame. See DETAIL "A".*

- 6. Secure stabilizer to base frame with existing mounting screw and locknut.
- 7. To increase spring compression, refer to ADJUSTING SPRING COMPRESSION in this procedure of the manual.

*NOTE: Adjust both stabilizers equally to maintain proper handling.*

- 8. Repeat for opposite stabilizer.
- 9. Test wheelchair for handling/maneuverability.
- 10. Repeat STEPS 1-7 until desired comfort and maneuverability is achieved

**Adjusting Spring Compression**

- 1. Perform one (1) of the following
  - A. To increase spring compression, turn adjustment nut **CLOCKWISE** two (2) to four (4) revolutions.
  - B. To decrease spring compression, turn adjustment nut **COUNTERCLOCKWISE** two (2) to four (4) revolutions.

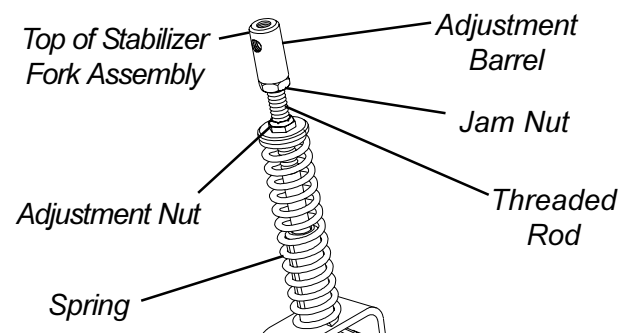
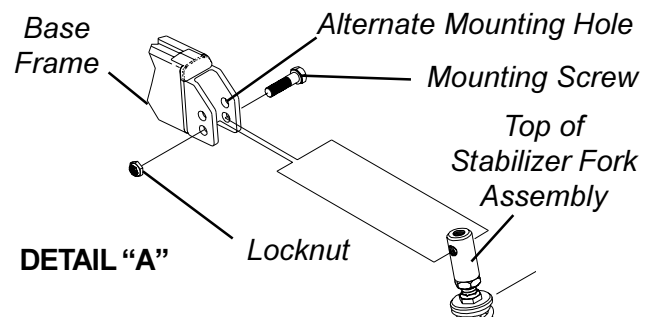


FIGURE 11 - ADJUSTING STABILIZERS

- Count the number of exposed threads and repeat this procedure for the opposite shock.
- Proceed to STEP 9 in HEIGHT ADJUSTMENT OF STABILIZERS in this procedure of the manual.

**REMOVING/INSTALLING GEARBOX (FIGURE 12)**

**CAUTION**  
Perform the following procedure in a designated work area to prevent damage to flooring (carpeting, tile, etc.).

**Removing**

- Remove the drive wheels from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
- Remove the drive wheel hub from the existing gearbox drive shaft. Refer to REMOVING/INSTALLING DRIVE WHEEL HUBS in PROCEDURE 12 of this manual.

*NOTE: Note the mounting position of gearbox to the suspension arm before gearbox disassembly.*

- Remove the four (4) mounting screws that secure the motor/gearbox to the suspension arm.
- If necessary, remove existing motor from gearbox. Refer to REMOVING/INSTALLING THE MOTOR in PROCEDURE 12 of this manual.
- If necessary, install existing motor onto NEW gearbox. Refer to REMOVING/INSTALLING THE MOTOR in PROCEDURE 12 of this manual.

**Installing**

**WARNING**  
When reinstalling the gearbox ALWAYS use the mounting holes furthest back on the suspension arm. DO NOT reposition the motors.

**CAUTION**  
The FRONT mounting screws that secure the gearbox to the suspension arm MUST be 5/16-18 x 2-1/2-inches long and the REAR hex screws that secure the gearbox to the suspension arm MUST be 5/16-18 x 1-1/4-inches long. Otherwise damage to the gearbox casting can result.

- Position the **NEW** gearbox with the mounting holes furthest back on the suspension arm.

- When reassembling the gearbox to the suspension arm, use Loctite 242 and torque mounting screws to 160-inch pounds.

*NOTE: Replace any parts that show signs of wear or damage.*

- Reinstall the drive wheel hub to the new gearbox drive shaft. Refer to REMOVING/INSTALLING DRIVE WHEEL HUBS in PROCEDURE 12 of this manual.
- Reinstall the drive wheels onto the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.

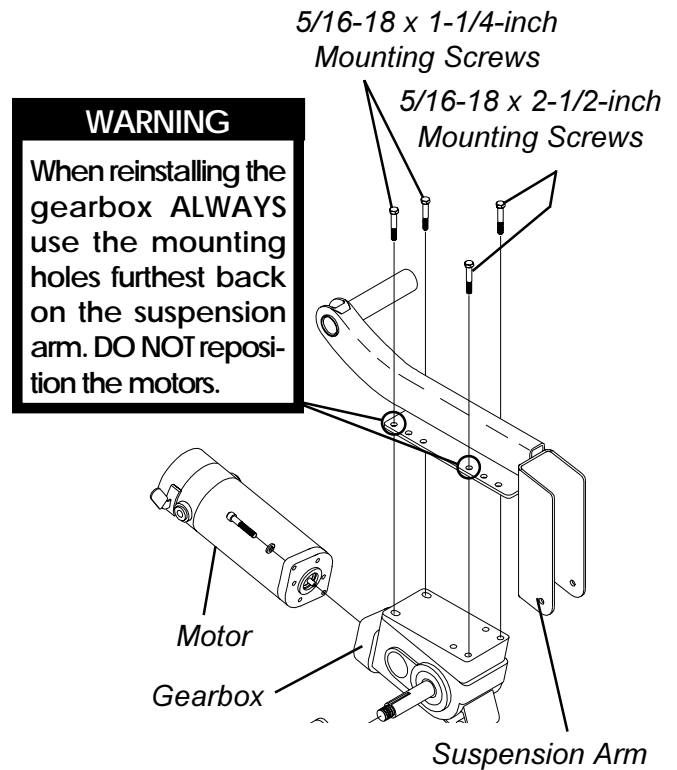


FIGURE 12 - REMOVING/INSTALLING GEARBOX

**REPLACING SUSPENSION ARM (FIGURE 13)**

- Remove the drive wheels from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
- Perform one (1) of the following:
  - (GROUP 24)** - Loosen the mounting screws that secures the wiring harness and the battery sub-frame to the base frame assembly.
  - (GROUP 22)** - Loosen the two (2) mounting screws that secures the rear of the battery tray to the sub-frame assembly.

3. Remove gearbox from the existing suspension arm. Refer to REMOVING/INSTALLING GEARBOX in this procedure of the manual.
4. Remove the mounting screw, two (2) flat washers, two (2) spring washers, two (2) inner link spacers, and locknut that secures the bracket end of the suspension arm, the bottom of the shock, and stabilizer bracket together.
5. Remove plug button from the middle of base frame.
6. Remove the mounting screw and the beveled washers that secures the tubular end of the suspension arm assembly to the base frame.
7. Remove the suspension arm from the wheelchair.
8. Position bracket end of NEW suspension arm around shock.
9. Thread existing mounting screw through stabilizer bracket, bracket end of suspension arm, and bottom of shock with mounting screw, two (2) flat washers, two (2) spring washers, two (2) inner link spacers, and locknut. See DETAIL "A" for proper hardware orientation. *Bracket End of Suspension Arm*

*NOTE: When installing the tubular end of the NEW suspension arm, the beveled washer MUST be placed on the inside and outside of the base frame, with the bevels facing each other.*

10. Secure tubular end of the NEW suspension arm assembly to base frame with existing mounting screw.
11. Torque suspension arm mounting screw (1/2 x 7-inches) to 85 FOOT pounds (approximately 1,020-inch pounds) and replace plug buttons.
12. Reinstall the gearbox onto the existing suspension arm. Refer to REMOVING/INSTALLING GEARBOX in this procedure of the manual.
13. Perform one (1) of the following:
  - A. **(GROUP 24)** - Tighten the mounting screws that secures the wiring harness and the battery sub-frame to the base frame assembly.
  - B. **(GROUP 22)** - tighten the two (2) mounting screws that secures the rear of the battery tray to the sub-frame assembly.
14. Reinstall the drive wheel onto the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
15. Repeat STEPS 1-14 for the opposite side of the wheelchair, if necessary.

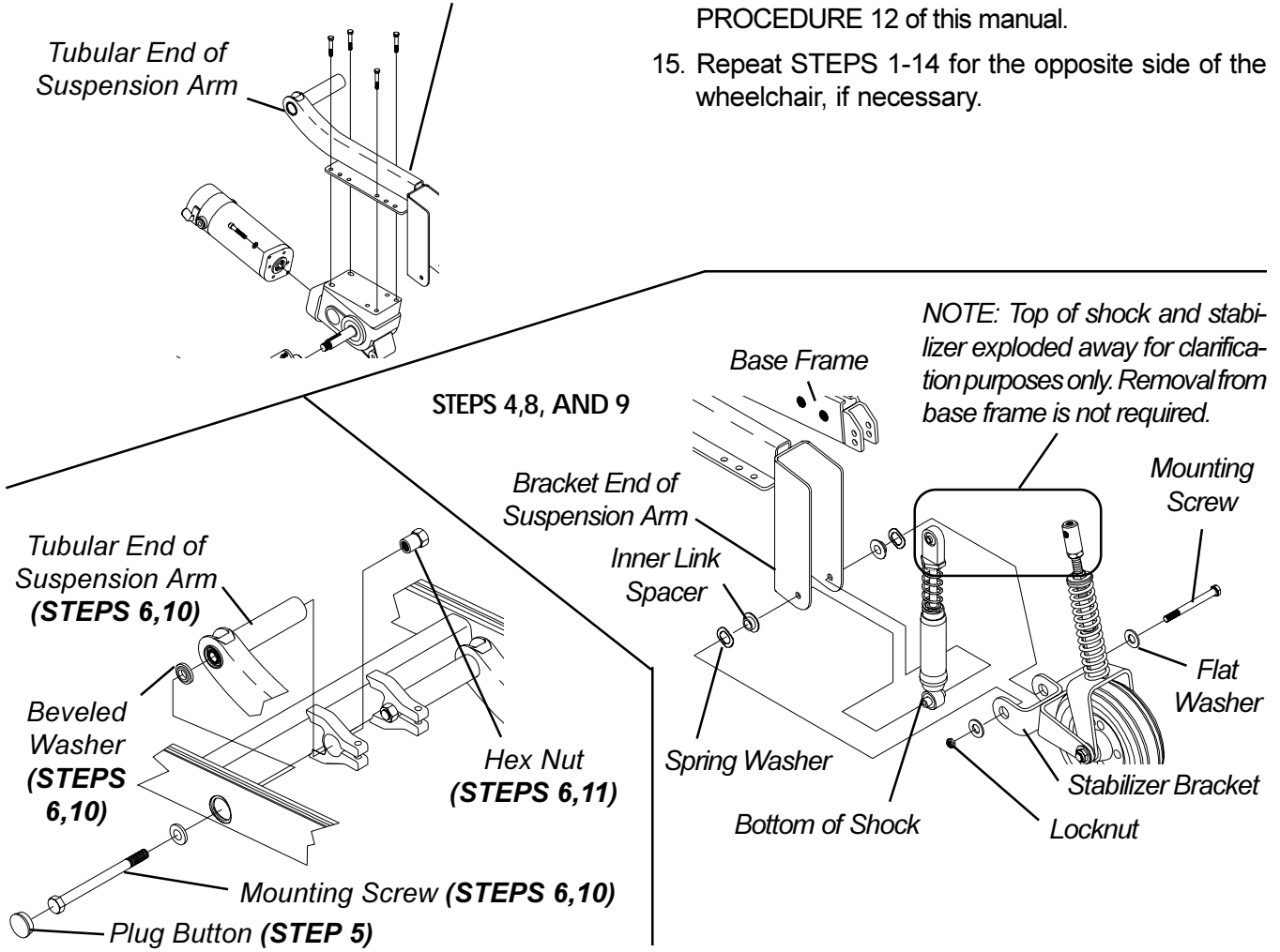


FIGURE 13 - REPLACING SUSPENSION ARM

- This Procedure includes the following:**
- Removing/Installing Group 24 Battery Box Sub-Frame
  - Removing/Installing Group 22 Battery Box Tray
  - Converting Group 22 Batteries to Group 24 Batteries
  - Shock Replacement
  - Shock Spring Replacement
  - Rubber Element Replacement
  - Converting Torque and X Rubber Elements to Shocks
  - Anti-Tipper Wheel Replacement
  - Removing/Installing Gearbox
  - Adjusting Weight Distribution
  - Repositioning Motor/Gearbox Assembly
  - Repositioning Gearless/Brushless Motor
  - Replacing Suspension Arm for Wheelchairs with Motor/Gearbox assembly
  - Replacing Suspension Arm for Wheelchairs with Gearless/Brushless Motor
  - Removing/Installing the Anti-tip Assembly

**WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

**REMOVING/INSTALLING GROUP 24 BATTERY BOX SUB-FRAME (FIGURE 1)**

**Removing**

1. Remove the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
2. Remove the two (2) mounting screws and locknuts that secure the wiring harness w/bracket and the rear of the existing sub-frame to the base frame. Refer to REMOVING/INSTALLING THE WIRING HARNESS in PROCEDURE 10 of this manual.
3. Remove the four (4) mounting screws that secure the shocks, retainer bar, spacers and retainer clips to the base frame. Refer to REPLACING BATTERY BOX RETAINER/RETAINER CLIP - GROUP 24 BATTERY BASE FRAMES in PROCEDURE 11 of this manual.
4. Remove the existing sub-frame assembly.

**Installing**

1. Install the two (2) mounting screws and locknuts that secure the wiring harness w/bracket and the back of the NEW sub-frame to the base frame. Refer to REMOVING/INSTALLING THE WIRING HARNESS in PROCEDURE 10 of this manual. Use Loctite 242 and torque mounting screws to 160-inch pounds.

2. Reinstall the four (4) mounting screws that secure the shocks, retainer bar, spacers and retainer clips to the base frame. Refer to REPLACING BATTERY BOX RETAINER/RETAINER CLIP - GROUP 24 BATTERY BASE FRAMES in PROCEDURE 11 of this manual. Use Loctite 242 and torque mounting screws to 160-inch pounds.
3. Reinstall the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual. Use Loctite 242 and torque mounting screws to 160-inch pounds.

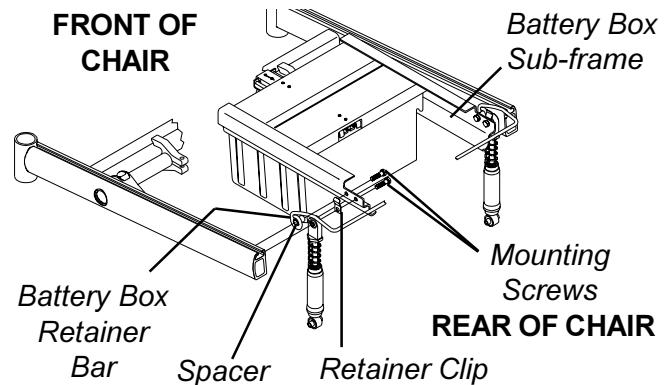
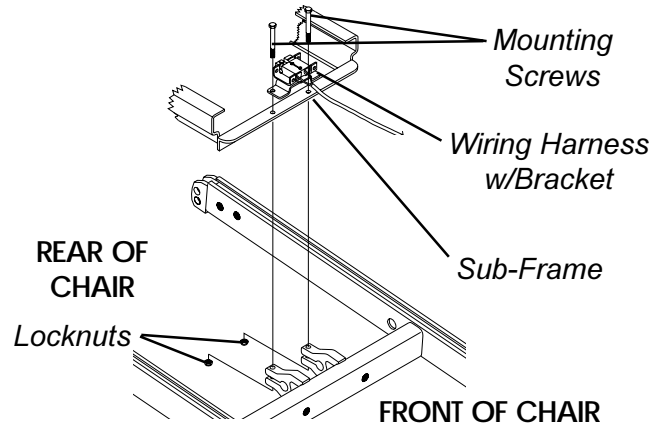


FIGURE 1 - REMOVING/INSTALLING GROUP 24 BATTERY BOX SUB-FRAME

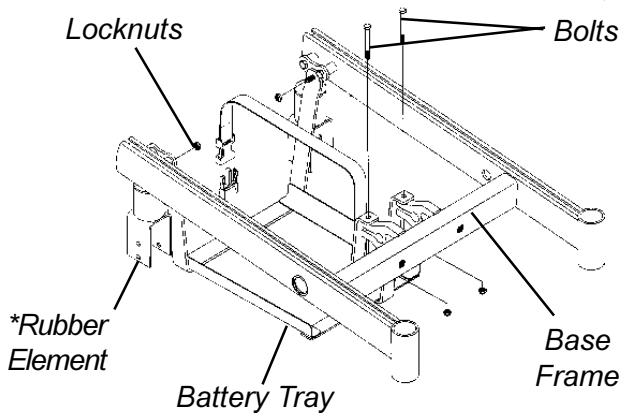
**REMOVING/INSTALLING GROUP 22 BATTERY BOX TRAY (FIGURE 2)**

**Removing**

1. Remove the battery box. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOX in PROCEDURE 9 of this manual.
2. Remove the two (2) rear locknuts that secure the battery box tray to battery mount brackets.
3. Remove the two (2) front bolts and locknuts that secure the battery box tray to the base frame.
4. Remove the battery tray from the base frame.

**Installing**

1. Install battery tray onto base frame.
2. Secure the rear of the battery tray to battery mount brackets with existing locknuts. Torque to 160-inch pounds.
3. Secure the front of the battery tray to the base frame with existing mounting screws and locknuts. Torque to 160-inch pounds.
4. Reinstall the battery box. Refer to INSTALLING/REMOVING BATTERY BOX - GROUP 22 BATTERY BASE FRAMES in PROCEDURE 9 of this manual.



*\*NOTE: Illustration depicts the rubber element. Battery Box Tray removes in the same manner for shock assembly.*

FIGURE 2 - REMOVING/INSTALLING GROUP 22 BATTERY BOX TRAY

**EQUIPMENT OPTION**

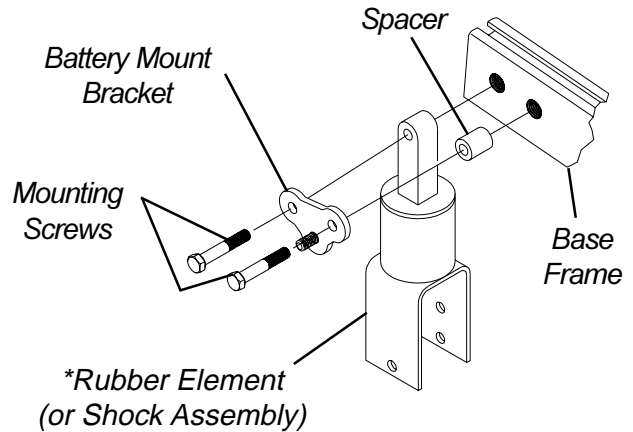
**CONVERTING GROUP 22 BATTERY BOX TRAY TO GROUP 24 BATTERY BOX SUB FRAMA ASSEMBLY**

**Removing Group 22 Components (FIGURE 3)**

1. Remove the battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX/BATTERIES in PROCEDURE 9 of this manual.
2. Remove the battery box tray. Refer to REMOVING/INSTALLING THE GROUP 22 BATTERY BOX TRAY in this procedure of the manual.
3. Remove the wiring harness. Refer to REMOVING/INSTALLING THE WIRING HARNESS in PROCEDURE 10 of this manual.

*NOTE: The battery box tray and the battery mount brackets will not be reused. Mounting screws and spacers will be reused.*

4. Remove the four (4) mounting screws that secure the battery mount brackets to the base frame.
5. Remove the battery mount brackets.



*\*NOTE: Illustration depicts rubber element. Battery Mount Brackets remove in the same manner for the shock assembly.*

FIGURE 3 - REMOVING GROUP 22 COMPONENTS

**Installing Group 24 Components (FIGURE 4)**

1. Line up the mounting holes in the front of the NEW battery box sub-frame and the NEW wiring harness w/bracket with the mounting holes in the base frame (FIGURE 5).
2. Install the two (2) mounting screws through the wiring harness w/bracket, battery box sub-frame, and base frame (FIGURE 5).
3. Install the locknuts onto mounting screws. Torque to 160-inch pounds (FIGURE 5).

**WARNING**

The Battery Box Retainer/Retainer Clip **MUST** be fastened securely in place before using the wheelchair. Use Loctite 242 and torque to 160-inch pounds.

4. Position the retainer clip between the NEW battery box sub-frame and the top of the rubber element or shock assembly making sure the retainer clip mounting hole is towards the bottom and the closed end of the clip is against the battery box retainer bar (FIGURE 5).

*NOTE: Make sure the closed end of the battery box retainer clip is pointing up.*

5. Install the mounting screw that secures the retainer clip to the battery box sub-frame. Use Loctite® 242 and torque to 160-inch pounds (FIGURE 5).
6. Line up the NEW battery box retainer bar and spacers with mounting holes in the base frame (FIGURE 5).



7. Reinstall the mounting screws that secure the battery box retainer bar to the base frame. Use Loctite 242 and torque to 160-inch pounds (FIGURE 5).
8. Perform STEPS 2-7 of REMOVING/INSTALLING THE WIRING HARNESS in PROCEDURE 10 of this manual to complete the wiring harness installation.
9. Install the group 24 battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.

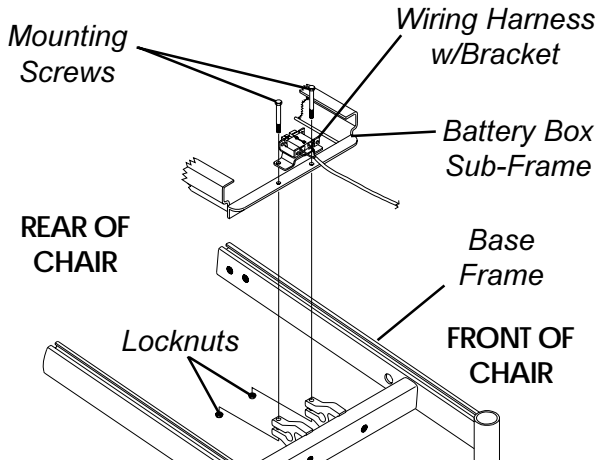
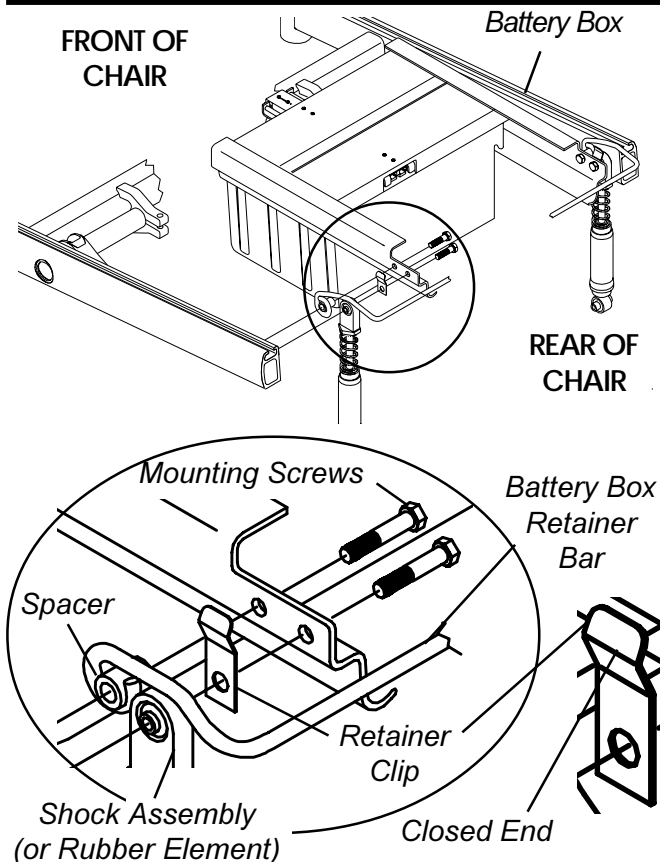
**STEPS 1 - 3****STEPS 4 - 7**

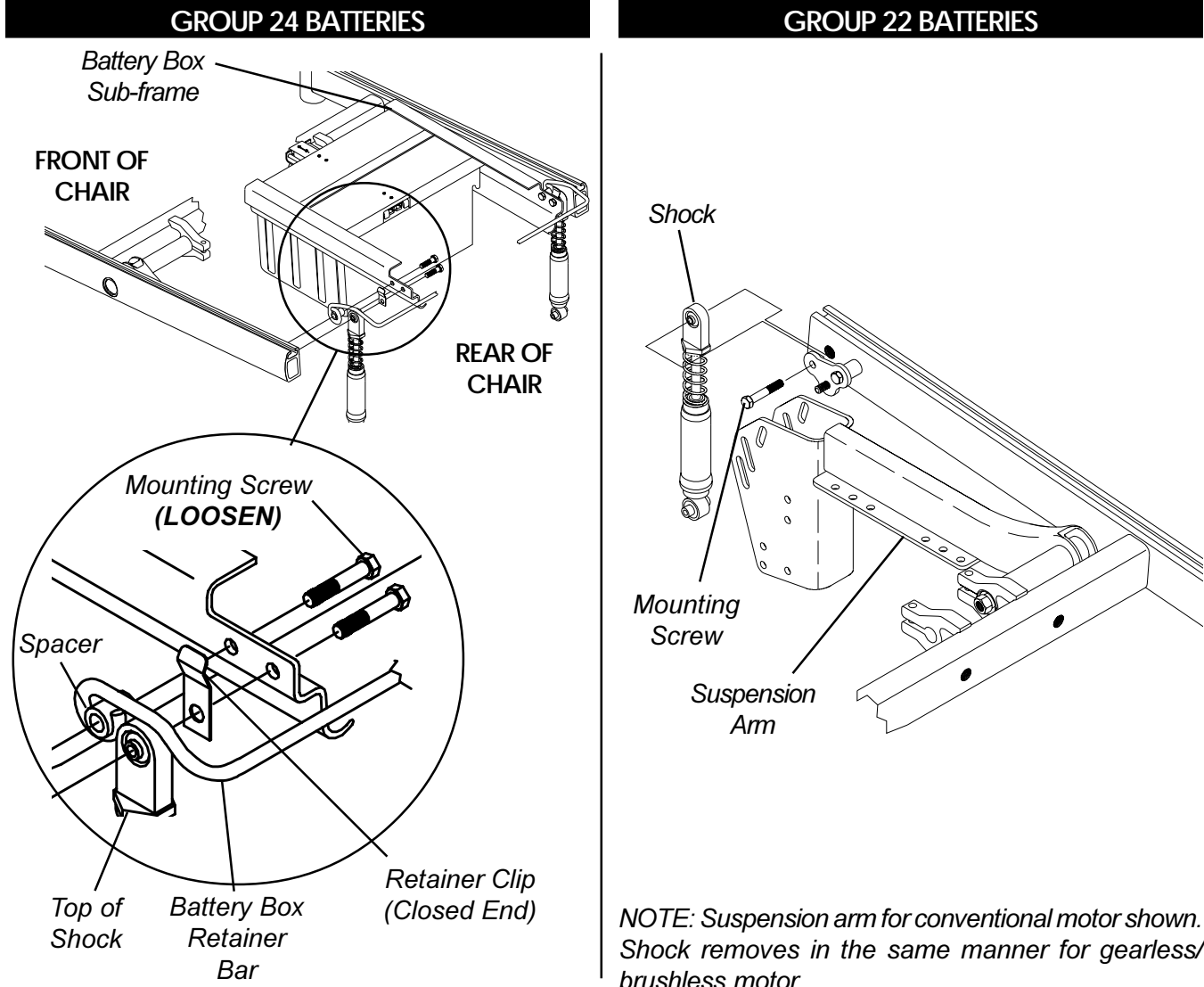
FIGURE 4 -INSTALLING GROUP 24 COMPONENTS

**SHOCK REPLACEMENT (FIGURE 5)**

1. Remove the group 22 battery box or group 24 battery boxes. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX or INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
2. Remove the drive wheel from the wheel hub. Refer to REMOVING/INSTALLING THE DRIVE WHEELS in PROCEDURE 12 of this manual.
3. **GROUP 24 BATTERIES ONLY** - Loosen the hex screw that secures the battery box retainer bar to the base frame.
4. Remove the mounting screw that secures the top of the shock to the base frame.
5. Remove the mounting screw and locknut from the bottom of the suspension arm.
6. Remove the shock from the base frame.
7. Install the NEW shock.
8. Perform one (1) of the following sections:
  - A. **GROUP 24 BATTERIES** -
    - Position retainer clip between shock and battery box sub-frame making sure the retainer clip mounting hole is towards the bottom and the closed end of clip is against battery box retainer bar.
    - Secure the top of shock and retainer clip to base frame. Apply Loctite 242 and torque to 160-inch pounds.
    - Apply Loctite 242 and torque the hex screw that secures the battery box retainer bar to the base frame to 160-inch pounds.
  - B. **GROUP 22 BATTERIES** - Secure the top of shock to base frame. Apply Loctite 242 and torque to 160-inch pounds.
9. Secure the bottom of the new shock to the suspension arm with the existing mounting screw and locknut. Apply Loctite 242 and torque to 160-inch pounds.
10. Install the drive wheel from the wheel hub. Refer to REMOVING/INSTALLING THE DRIVE WHEELS in PROCEDURE 12 of this manual.
11. Remove the group 22 battery box or group 24 battery boxes. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX or INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.

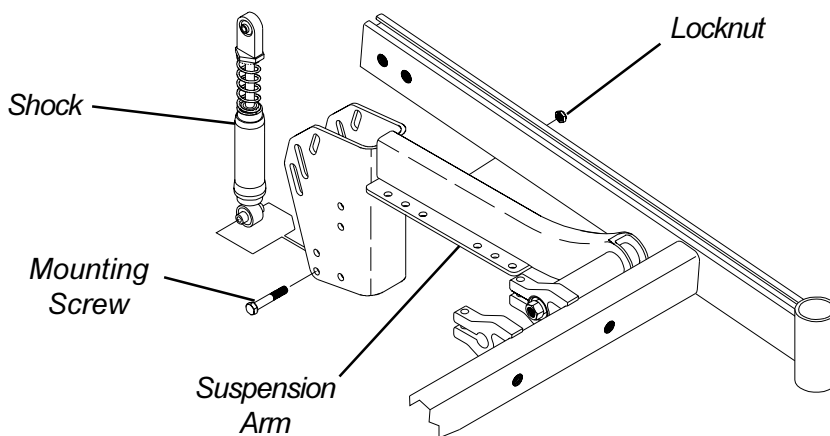
### TOP OF SHOCK

R  
W  
D  
  
W  
H  
E  
E  
L  
C  
H  
A  
I  
R  
S



### BOTTOM OF SHOCK

#### GROUP 22 AND GROUP 24 BATTERIES

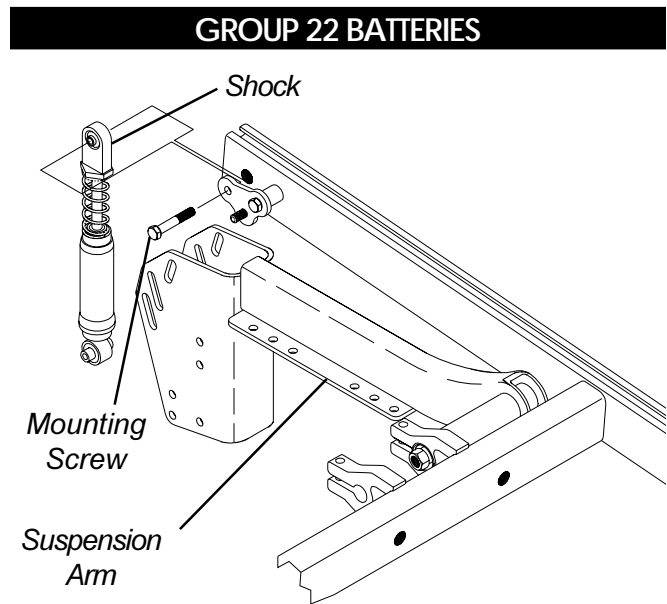


*NOTE: Suspension arm shown is for conventional motors. Shock removes in the same manner for gearless/brushless motor.*

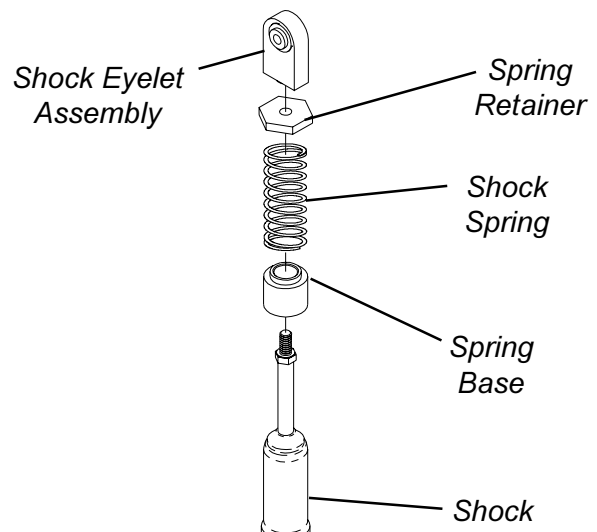
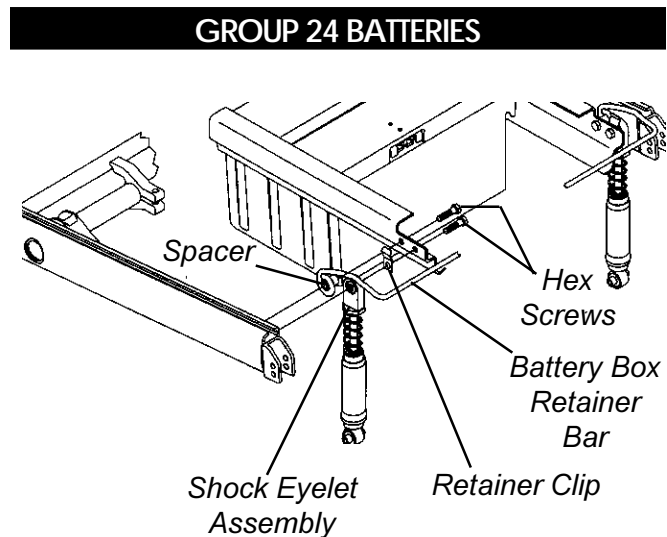
FIGURE 5 - SHOCK REPLACEMENT

## SHOCK SPRING REPLACEMENT (FIGURE 6)

1. Remove the group 22 battery box or group 24 battery boxes. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX or INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
2. **GROUP 24 BATTERIES ONLY** - Loosen the mounting screw that secures the battery box retainer bar to the base frame.
3. Remove the mounting screw that secures the top of the shock to the suspension arm.
4. Swing the top of the shock rearward.
5. Hold the spring retainer and turn the shock eyelet assembly counterclockwise to unthread it from the shock.
6. Remove the spring retainer and spring.
7. Place the NEW spring onto the shock.
8. Reinstall the shock eyelet assembly and the spring retainer onto the NEW spring.
9. While holding the spring retainer, torque the shock eyelet assembly to 245-inch pounds.
10. Position the retainer clip between the shock and the battery box sub-frame making sure the retainer clip mounting hole is towards the bottom and the closed end of the clip is against the battery box retainer.
11. Secure top of shock and retainer clip to base frame. Apply Loctite 242 and torque to 160-inch pounds.
12. **GROUP 24 BATTERIES ONLY** - Apply Loctite 242 and torque the hex screw that secures the battery box retainer bar to the base frame to 160-inch pounds.
13. Reinstall the group 22 battery box or group 24 battery boxes. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX or INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.



*NOTE: Shock exploded away for clarity. There is no need to remove shock from suspension arm.*



**FIGURE 6 - SHOCK SPRING REPLACEMENT**

**RUBBER ELEMENT REPLACEMENT (FIGURE 7)**

*NOTE: Rubber elements are only found on Storm Torque and Storm X wheelchairs.*

1. Remove the battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.
2. Remove the battery box tray. Refer to REMOVING THE BATTERY BOX TRAY in this procedure of the manual.
3. Loosen the mounting screw that secures the battery mount bracket to the base frame, but do not remove.
4. Remove the mounting screw that secures the top of the rubber element and battery mount bracket to the base frame.
6. Remove the three (3) mounting screws and locknuts that secure the bottom of the rubber element to the rubber element mount bracket.
7. Remove the existing rubber element and install the new rubber element.
8. Resecure the bottom of the rubber element to the rubber element mount bracket with the existing three (3) mounting screws. Use Loctite 242 and torque to 160-inch pounds.
9. Reinstall the hex screw that secures the top of the rubber element and battery mount bracket to the base frame. Use Loctite 242 and torque to 160-inch pounds.
10. Torque the hex screw that secures the battery mount bracket to the base frame to 160-inch pounds.
11. Reinstall the battery box tray onto the hanger bracket and torque the locknut to 160-inch pounds.
12. Reinstall the battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.

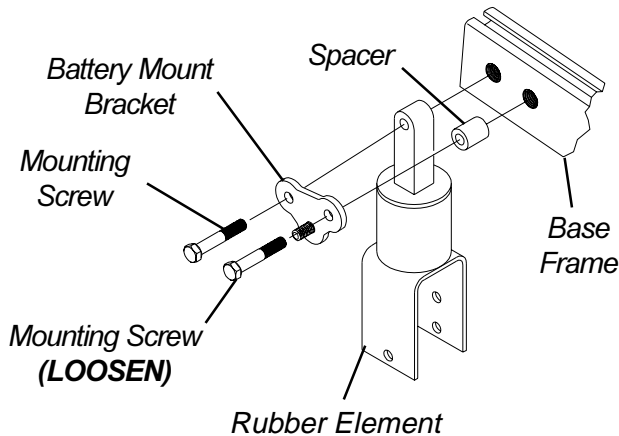


FIGURE 7 - RUBBER ELEMENT REPLACEMENT

**EQUIPMENT OPTION**

**CONVERTING TORQUE AND X RUBBER ELEMENTS TO ARROW SHOCKS (FIGURE 8)**

1. Remove the battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.
2. Remove the existing Torque and X rubber element. Refer to RUBBER ELEMENT REPLACEMENT - TORQUE AND X BASE FRAMES in this procedure of the manual.
3. Line up the bottom of the new Storm Arrow shock with the BOTTOM hole in the rubber element mount plate.
4. Install the new hex screw and locknut through the bottom hole of the mount bracket and shock. Torque to 160-inch pounds.

*NOTE: The original hardware that secured the BOTTOM of the Torque and X rubber element to the shock mount bracket will not be used with this option. Keep for future use.*

5. Reinstall the hex screw that secures the top of the shock assembly and battery mount bracket to the base frame. Use Loctite 242 and torque to 160-inch pounds.
6. Torque the hex screw that secures the battery mount bracket to the base frame to 160-inch pounds.
7. Reinstall the battery box tray onto the battery mount bracket and torque the locknut to 160-inch pounds.
8. Reinstall the battery box. Refer to INSTALLING/REMOVING GROUP 22 BATTERY BOX in PROCEDURE 9 of this manual.

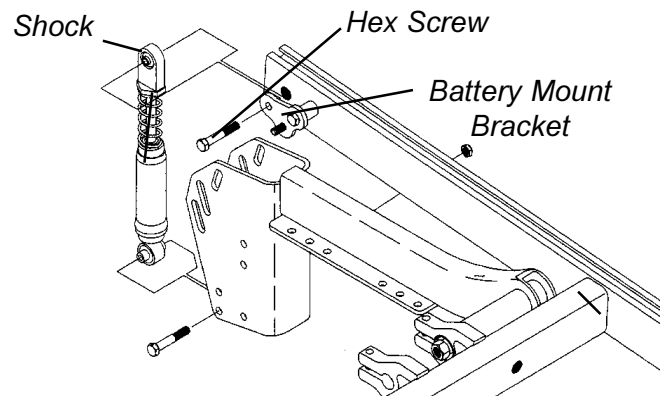


FIGURE 8 - CONVERTING TORQUE AND X RUBBER ELEMENTS TO ARROW SHOCKS

## REMOVING/INSTALLING GEARBOX (FIGURE 10)

### CAUTION

Perform the following procedure in a designated work area to prevent damage to flooring (carpeting, tile, etc.).

### Removing

1. Remove the drive wheels from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
2. Remove the drive wheel hub from the existing gearbox drive shaft. Refer to REMOVING/INSTALLING DRIVE WHEEL HUBS in PROCEDURE 12 of this manual.

*NOTE: Note mounting position of gearbox to suspension arm before disassembly.*

*NOTE: To reposition the gearbox on the suspension arm, refer to WEIGHT DISTRIBUTION in this procedure of the manual.*

3. Remove the four (4) hex screws that secure the existing motor/gearbox to the suspension arm.
4. Remove existing motor from gearbox. Refer to MOTOR REPLACEMENT in PROCEDURE 12 of this manual.
5. Install existing motor onto new gearbox. Refer to MOTOR REPLACEMENT in PROCEDURE 12 of this manual.

### Installing

### CAUTION

The REAR hex screws that secure the gearbox to the suspension arm MUST be 5/16-18 x 2-1/2-inches long and the FRONT hex screws that secure the gearbox to the suspension arm MUST be 5/16-18 x 1-1/4-inches long. Otherwise damage to the gearbox casting can result.

1. Position NEW gearbox with noted mounting holes.
2. When reassembling gearbox to suspension arm, use Loctite 242 and torque hex screws to 160-inch pounds.

*NOTE: Replace any parts that show signs of wear or damage.*

3. Reinstall the drive wheel hub to the new gearbox driveshaft. Refer to REMOVING/INSTALLING DRIVE WHEEL HUBS in PROCEDURE 12 of this manual.
4. Reinstall the drive wheels onto the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.

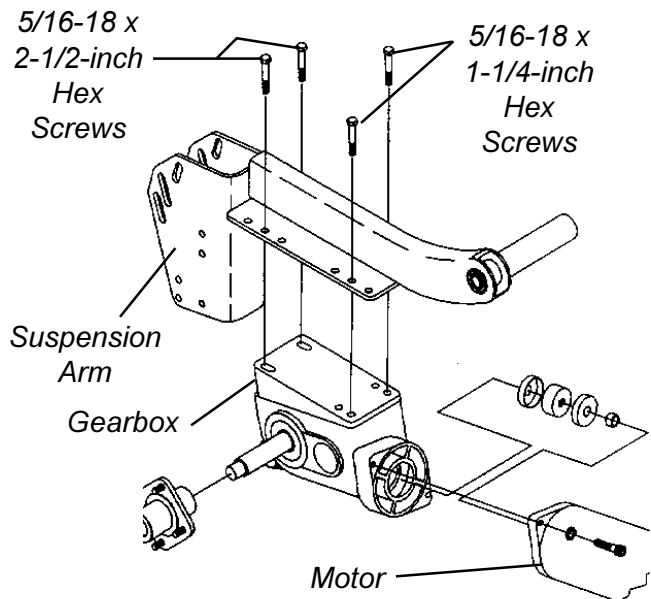


FIGURE 10 - REMOVING/INSTALLING GEARBOX

## ADJUSTING WEIGHT DISTRIBUTION (FIGURE 11)

*NOTE: Seat mount plates and seat support brackets allow the seat frame to be repositioned along the base frame. The range is determined by position of the seat stop screws. The front seat stop screw is positioned at 4-inches and the rear seat stop screw is positioned at 10-inches. Both seat stop screw positions are measured from the front of the base frame.*

*NOTE: The position of the seat support brackets is factory set at 7-inches, this measured from the front of the base frame to the front of the seat support bracket. This will put about 70% of the total weight of the chair and user over the large wheels. However, this setting may not be the most desirable in terms of maneuverability, front rigging clearance and comfort for the user.*

### Adjustment Options

*NOTE: This section will provide the user with some knowledge of what to expect if the following adjustments are made.*

1. Moving the seat forward.
 

Advantage:	This adjustment allows more clearance for front riggings and a more stable "feel" for the user.
Disadvantage:	More weight is put on front casters and makes turning more difficult.

*NOTE: This option can also be accomplished by moving the motor backward on the suspension arm. Refer to REPOSITIONING GEARBOX in this procedure of the manual.*

2. Moving the seat rearward.

- Advantage: Makes turning easier and provide better traction for the large wheels.
- Disadvantage: This adjustment, however, allows less clearance for front riggings and the user will experience more engagement of the anti-tippers.

*NOTE: This option can also be accomplished by moving the motor forward on the suspension arm. Refer to REPOSITIONING GEARBOX in this procedure of the manual.*

**Adjusting Weight Distribution Procedure**

1. Loosen the four (4) mounting screws that secure the seat support brackets to the base frame.

**WARNING**

**DO NOT** adjust seat beyond limit stops.

2. Adjust seat forward or back to the position determined from the previous section ADJUSTMENT OPTIONS.
3. Retighten the four (4) mounting screws securing the seat support brackets to the base frame.
4. Test wheelchair maneuverability, comfort, and handling.
5. Repeat STEPS 1-4 for further adjustment, if necessary.

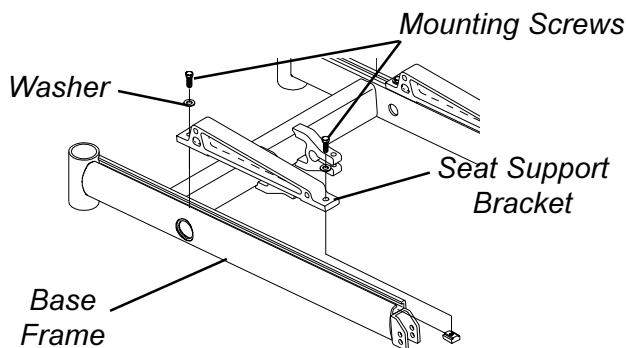


FIGURE 11 - ADJUSTING WEIGHT DISTRIBUTION

**REPOSITIONING THE MOTOR/GEARBOX (FIGURE 12)**

*NOTE: The motor/gearbox assembly can be repositioned to lengthen or shorten the wheelbase by 2-inches in 1-inch increments.*

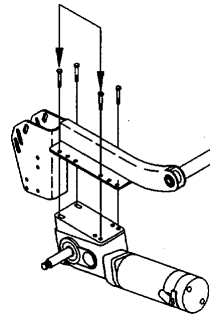
**STANDARD POSITION - LENGTHENS** the wheelbase and gives you the most stability and standard maneuverability.

**1 - INCH FORWARD - CENTERS** the wheelbase and gives you standard stability and maneuverability.

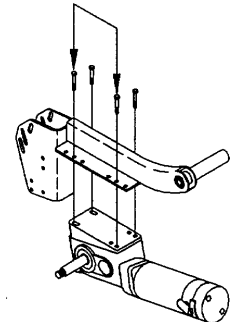
**2 - INCH FORWARD - SHORTENS** the wheelbase and increases maneuverability and distributes additional weight on rear wheels.

**MOTOR/GEARBOX ASSEMBLY**

**Standard -**  
**Approximately 65% of**  
**weight over rear**  
**wheels**



**1 - Inch Forward -**  
**Approximately 70% of**  
**weight over rear**  
**wheels**



**2 - Inch Forward -**  
**Approximately 75% of**  
**weight over rear**  
**wheels**

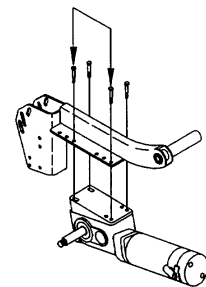


FIGURE 12 - REPOSITIONING MOTOR/GEARBOX

**WARNING**

**When using a recliner/high back van seat, the motor/gearbox or motor MUST use most REARWARD mounting holes on the suspension arm assembly.**

1. Determine the desired position for the gearbox on the wheelchair.
2. Remove the drive wheels from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
3. Remove gearbox from the suspension arm. Refer to REMOVING/INSTALLING GEARBOX in this procedure of the manual.
4. Move gearbox to the position determine in STEP 1.

*NOTE: If the wheelchair is equipped with 9-inch casters on a standard or heavy duty base, the 2-inch forward position CAN NOT be utilized.*

5. Reinstall the gearbox onto the existing suspension arm. Refer to REMOVING/INSTALLING GEARBOX in this procedure of the manual.
6. Repeat STEPS 3-5 for opposite side of the wheelchair.
7. Reinstall the drive wheel onto the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.

## REPOSITIONING THE GEARLESS/BRUSHLESS MOTOR (FIGURE 13,14)

### Acceptable mounting positions for the gearless/brushless motor.

*NOTE: The motor/gearbox assembly or gearless/brushless motor can be repositioned to lengthen or shorten the wheelbase by 2-inches in 1-inch increments.*

RWD WHEELCHAIRS

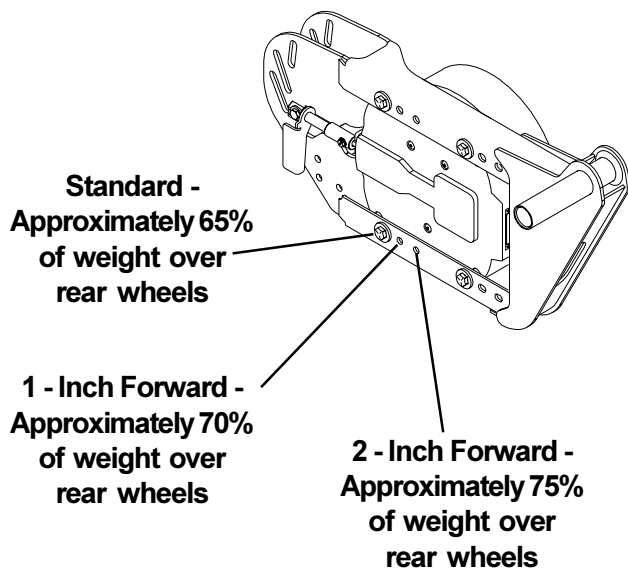
#### ARROW AND STORM X

*NOTE: These mounting positions apply to the Arrow and Storm X with fixed back or recliner and torque with manual recline option*

**STANDARD POSITION - LENGTHENS** the wheelbase and gives you the most stability and standard maneuverability.

**1-INCH FORWARD - CENTERS** the wheelbase and gives you standard stability and maneuverability.

**2-INCH FORWARD - SHORTENS** the wheelbase and increases maneuverability and distributes additional weight on rear wheels.



#### TORQUE

*NOTE: These mounting positions apply to the Torque with fixed back.*

**STANDARD POSITION - SHORTENS** the wheelbase and increases maneuverability and distributes additional weight on rear wheels.

**1-INCH REARWARD - CENTERS** the wheelbase and gives you standard stability and maneuverability.

**2-INCH REARWARD - LENGTHENS** the wheelbase and gives you the most stability and standard maneuverability.

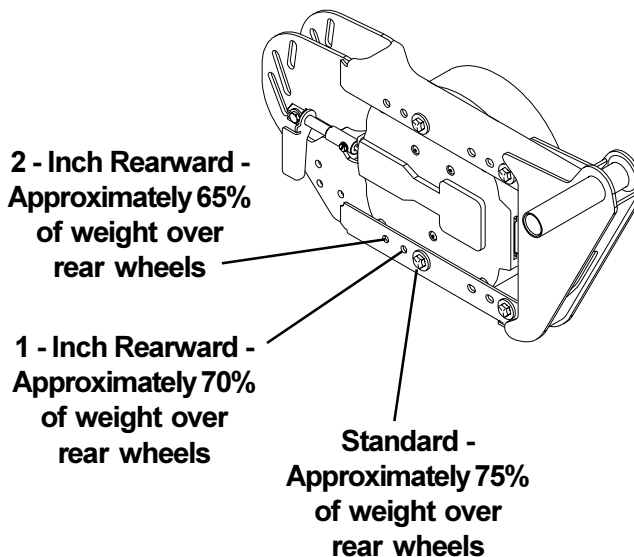


FIGURE 13 - REPOSITIONING THE GEARLESS/BRUSHLESS MOTOR

1. Determine the desired mounting position of the gearless/brushless motor. Refer to ACCEPTABLE MOUNTING POSITIONS FOR THE GEARLESS/BRUSHLESS MOTOR in this procedure of the manual.
2. Remove the group 22 battery box or group 24 battery boxes. Refer to INSTALLING/REMOVING BATTERY BOX - GROUP 22 BATTERY BASE FRAMES or INSTALLING/REMOVING BATTERY BOXES - GROUP 24 BATTERY BASE FRAMES in PROCEDURE 9 of this manual.
3. If necessary, remove the battery box tray. Refer to REMOVING THE BATTERY BOX TRAY in this procedure of the manual.
4. Remove the drive wheel from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
5. Loosen the adjustment screw that secures the motor release handle to the brake release shaft.
6. Remove the four (4) mounting screws and washers that secure the motor to the suspension arm.
7. Slide the motor forward or backward to the desired mounting position.
8. Secure the motor to the mounting position determined in STEP 1 and secure with the four (4) existing mounting screws and washers. Torque to 13 foot/pounds.
9. Securely tighten adjustment screw.

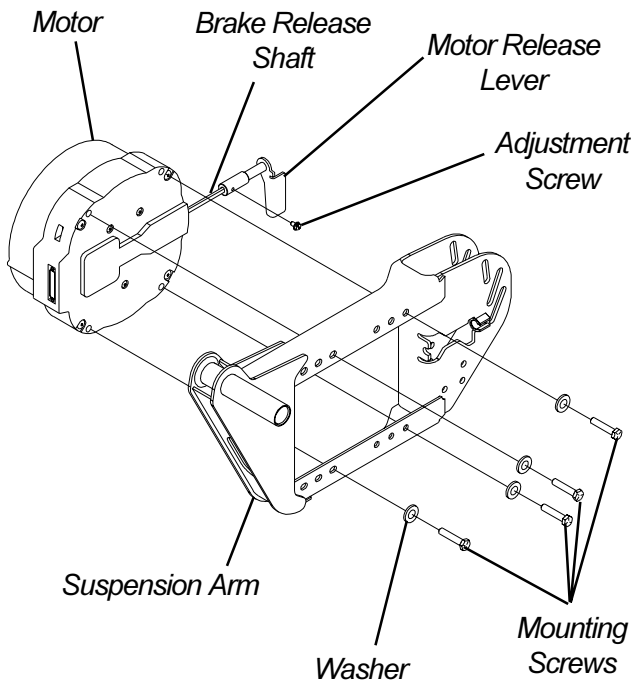


FIGURE 14 - REPOSITIONING THE GEARLESS/BRUSHLESS MOTOR

10. Reinstall the drive wheel to the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
11. Repeat STEPS 1-9 for opposite side of wheelchair.
12. If necessary, reinstall the battery box tray. Refer to REMOVING THE BATTERY BOX TRAY in this procedure of the manual.
13. Remove the group 22 battery box or group 24 battery boxes. Refer to INSTALLING/REMOVING BATTERY BOX - GROUP 22 BATTERY BASE FRAMES or INSTALLING/REMOVING BATTERY BOXES - GROUP 24 BATTERY BASE FRAMES in PROCEDURE 9 of this manual.

**REPLACING SUSPENSION ARM FOR WHEELCHAIRS WITH MOTOR/GEARBOX ASSEMBLY (FIGURE 15)**

1. Remove the drive wheels from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
  2. Loosen the hex screws that secure wiring harness to sub-frame assembly.
  3. Remove gearbox from the existing suspension arm. Refer to REMOVING/INSTALLING GEARBOX in this procedure of the manual.
  4. Remove plug buttons from the middle of the base frame.
  5. Remove the hex screws and the beveled washers that secure the suspension arm assembly to the base frame.
  6. Remove existing suspension arm from the wheelchair.
- NOTE: When installing the NEW suspension arm, the beveled washers MUST be placed on the inside and outside of the base frame, with the bevels facing each other.*
7. Install the NEW suspension arm assembly onto the base frame.

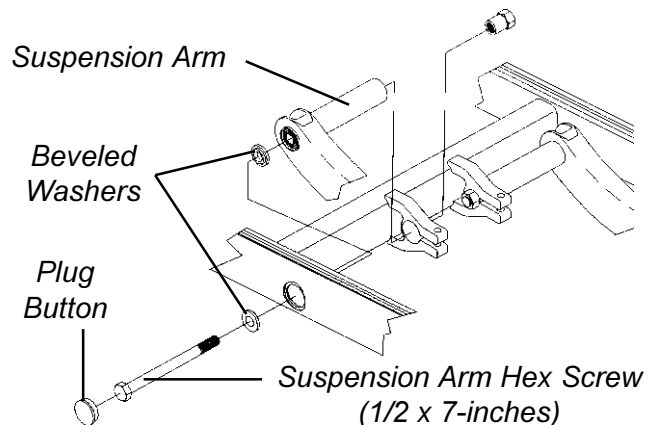


FIGURE 15 - REPLACING SUSPENSION ARM FOR WHEELCHAIRS WITH MOTOR/GEARBOX ASSEMBLY



8. Torque suspension arm hex screws (1/2 x 7-inches) to 85 FOOT pounds (approximately 1,020-inch pounds) and replace plug buttons.
9. Reinstall the gearbox onto the existing suspension arm. Refer to REMOVING/INSTALLING GEARBOX in this procedure of the manual.
10. Tighten the hex screws that secure wiring harness to sub-frame assembly securely.
11. Reinstall the drive wheel onto the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
12. Repeat STEPS 1-12 for the opposite side of the wheelchair, if necessary.

## REPLACING SUSPENSION ARM FOR WHEELCHAIRS WITH GEARLESS/BRUSHLESS MOTORS (FIGURE 16)

1. Perform one (1) of the following:
  - A. Remove the seating system. Refer to the seating systems owner's manual for removal/installation instructions.
  - B. Remove the seat pan. Refer to REMOVING/INSTALLING THE SEAT PAN in PROCEDURE 6 of this manual.
2. Remove the motor. Refer to REMOVING/INSTALLING THE MOTOR in PROCEDURE 12 of this manual.
3. Cut the tie-wrap(s) that secure the wiring harness/charger cable to the suspension arm.
4. Remove the anti-tip assembly from the rear of the suspension arm. Refer to REMOVING/INSTALLING THE ANTI-TIP ASSEMBLY in this procedure of the manual.
5. Remove the shock from the suspension arm. Refer to REMOVING/INSTALLING THE SHOCK ASSEMBLY in this procedure of the manual.
6. Remove the plug buttons from the side of the base frame.
7. Remove the mounting screw and beveled washers that secure the front of the suspension arm to the base frame.
8. Remove the existing suspension arm from the base frame.
9. Install the new suspension arm onto the base frame.
10. Install mounting screw and beveled washers that secure the front of the suspension arm to the base frame.
11. Install the plug buttons into the side of the base frame

12. Install the shock onto the new suspension arm. Refer to REMOVING/INSTALLING THE SHOCK ASSEMBLY in this procedure of the manual.
13. Install the motor onto the new suspension arm. Refer to REMOVING/INSTALLING THE MOTOR in PROCEDURE 12 of this manual.
14. Install anti-tip assembly onto the rear of the new suspension arm. Refer to REMOVING/INSTALLING THE ANTI-TIP ASSEMBLY in this procedure of the manual.
15. Perform one (1) of the following:
  - A. Remove the seating system. Refer to the seating systems owner's manual for removal/installation instructions.
  - B. Remove the seat pan. Refer to REMOVING/INSTALLING THE SEAT PAN in PROCEDURE 6 of this manual.

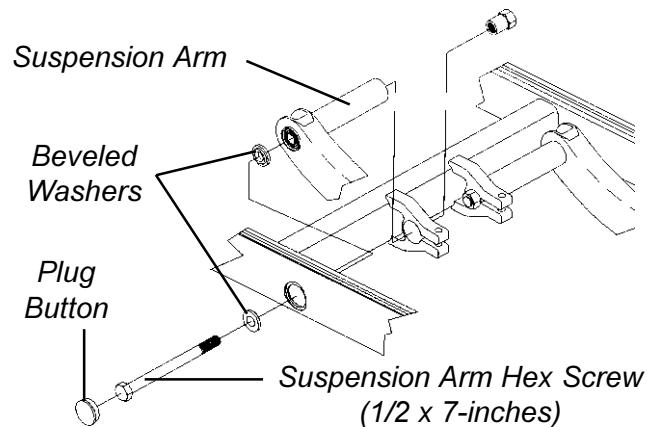


FIGURE 16 - REPLACING SUSPENSION ARM FOR WHEELCHAIRS WITH GEARLESS/BRUSHLESS MOTOR

## ANTI-TIPPER WHEEL REPLACEMENT (FIGURE 9)

1. Remove the locknuts, hex screws and spacers that secure the anti-tipper wheels to the shock mount plates.
2. Replace anti-tipper wheel(s) and torque existing hardware to 30-35-inch pounds. DO NOT overtighten.

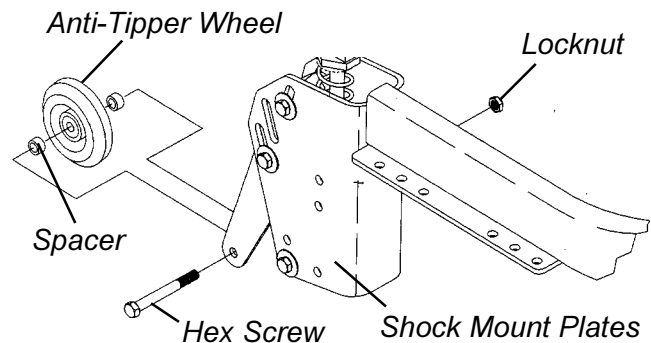


FIGURE 9 - ANTI-TIPPER WHEEL REPLACEMENT

**REMOVING/INSTALLING THE ANTI-TIP ASSEMBLY**

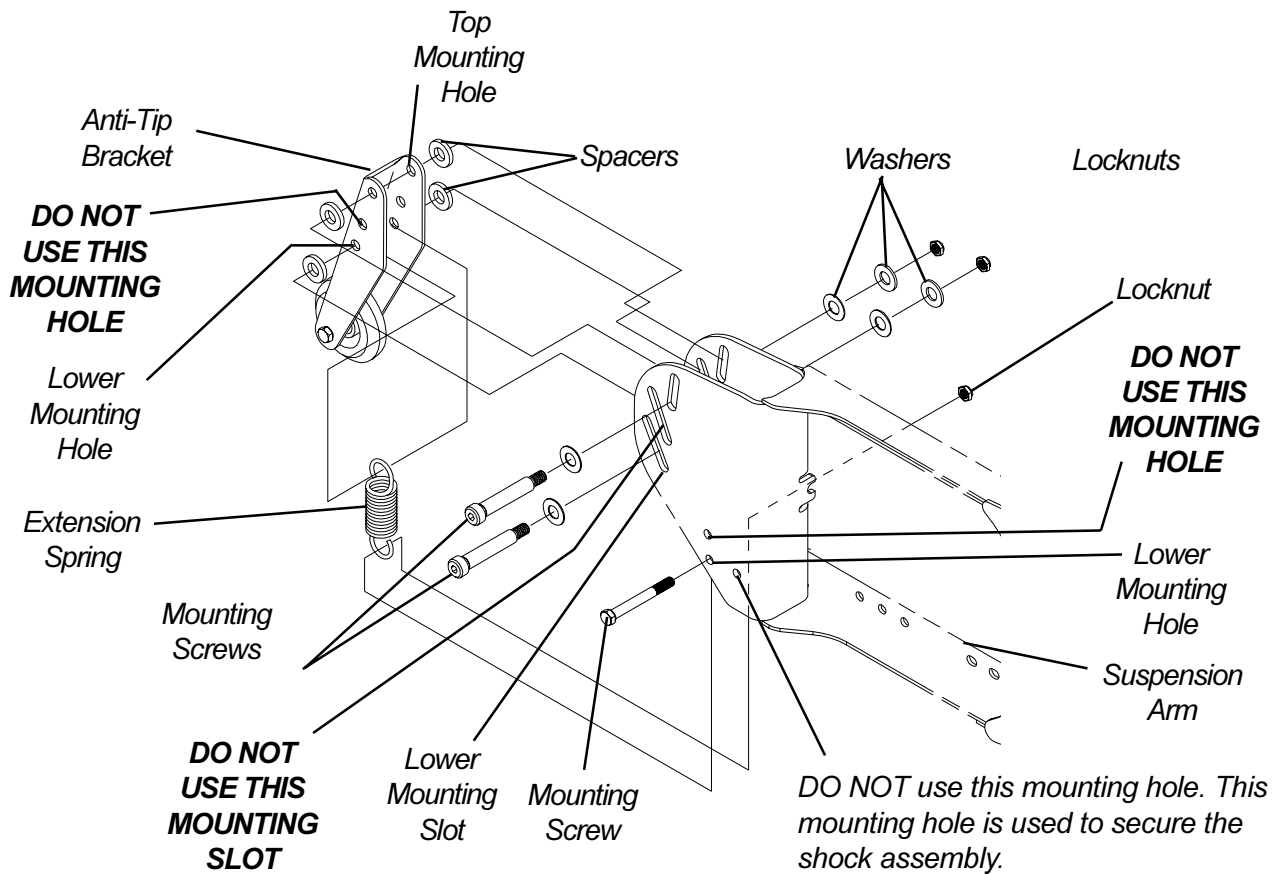
**Removing**

1. Remove the mounting screw, washers, and spacers that secure the top of the anti-tip bracket to the suspension arm.
2. Remove the mounting screw and locknut that secure the extension spring in place.
3. Remove the mounting screw, washers, and spacers that secure the bottom of the anti-tip bracket to the suspension arm.

**Installing**

1. Align top mounting hole of anti-tip bracket with top mounting slot in rear of suspension arm.

2. Secure top of anti-tip bracket to suspension arm with existing mounting screw, washers, spacers, and locknut. Securely tighten.
3. Align lower mounting hole of the anti-tip mounting bracket with the lower slot of the suspension arm.
4. Secure the anti-tip bracket to the suspension arm with the existing mounting screw, washers, spacers, and locknuts. Securely tighten.
5. Hook one end of the extension spring around mounting screw.
6. Install mounting screw through lower mounting hole in suspension arm, other end of extension spring and opposite side of suspension arm. Securely tighten with locknut.



*NOTE: Suspension arm shown is for gearless/brushless motor. The Anti-tip assembly removes/installs in the same manner on the suspension arm used with the conventional motor/gearbox assembly.*

**FIGURE 17 - REMOVING/INSTALLING THE ANTI-TIP ASSEMBLY**

<p><b>This Procedure includes the following:</b></p> <p><i>Removing/Installing Rear Shroud</i></p> <p><i>Removing/Installing Front Shroud</i></p> <p><i>Removing/Installing Side Shroud Assembly</i></p> <p><i>Removing/Installing Counterweight</i></p> <p><i>Replacing Group 24 Battery Box Sub-Frame</i></p> <p><i>Removing/Installing Shocks</i></p> <p><i>Shock Spring Replacement</i></p> <p><i>Tie Rod Replacement</i></p> <p><i>Removing/Installing Gearbox</i></p> <p><i>Sensor Cable Assembly Replacement</i></p> <p><i>Replacing Suspension Arm</i></p> <p><i>Removing/Installing The Wiring Harness</i></p> <p><i>Adjusting Weight Distribution</i></p>
---

**WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely - otherwise injury or damage may result.

**REMOVING/INSTALLING REAR SHROUD (FIGURE 1)**

**Removing**

1. Turn the two (2) wing nuts COUNTERCLOCKWISE and lift up on the rear shroud.

**Installing**

1. Position the rear shroud on the wheelchair frame aligning the two (2) wing nuts with the mounting brackets.
2. Turn the two (2) wing nuts CLOCKWISE to secure rear shroud in place.

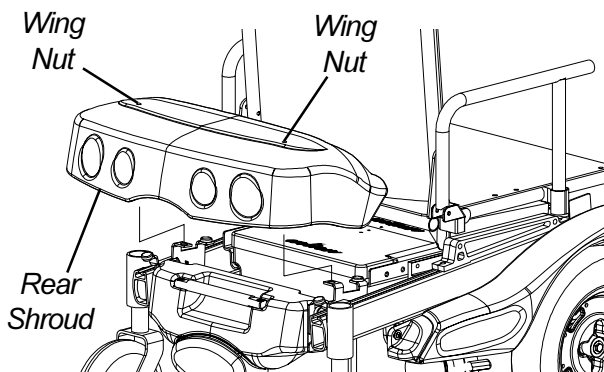


FIGURE 1 - REMOVING/INSTALLING REAR SHROUD

**REMOVING/INSTALLING FRONT SHROUD (FIGURE 2)**

**Removing**

1. Turn the two (2) wing nuts on the TOP of the front shroud COUNTERCLOCKWISE.
2. Turn the wing nut on the BOTTOM of the front shroud COUNTERCLOCKWISE and lift up on the front shroud.

**Installing**

1. Position the front shroud on the wheelchair frame.
2. Align the wing nut on the BOTTOM of the front shroud with the mounting bracket on the wheelchair frame.
3. Align the two (2) wing nuts on the TOP of the front shroud with the mounting holes in the wheelchair frame.
4. Turn the wing nut on the BOTTOM of the front shroud CLOCKWISE to secure front shroud in place.
5. Turn the two (2) wing nuts on the TOP of the front shroud CLOCKWISE to secure front shroud in place.

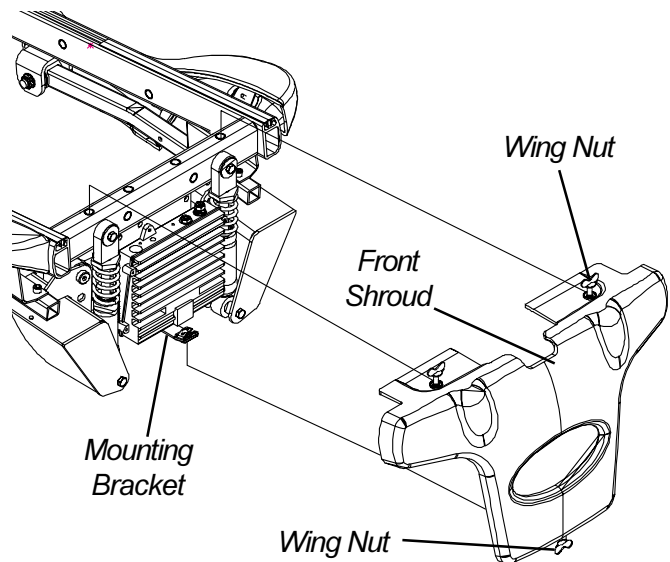


FIGURE 2 - REMOVING/INSTALLING FRONT SHROUD

**REMOVING/INSTALLING SIDE SHROUD ASSEMBLY (FIGURE 3)**

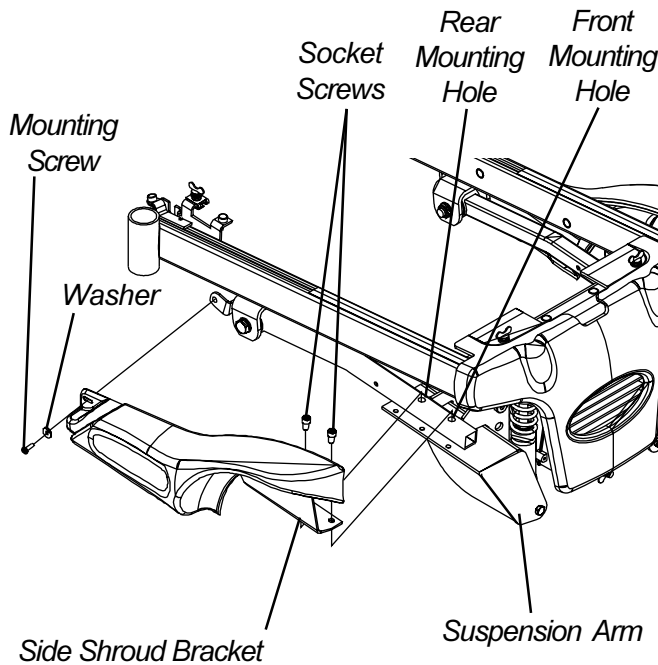
**Removing**

1. Remove the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
2. Remove the drive wheel from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEEL in PROCEDURE 12 of this manual.

3. Remove the two (2) socket screws that secure the side shroud bracket to the suspension arm.
4. Remove the mounting screw and washer that secures the REAR of the side shroud to the suspension arm.
5. Remove the side shroud assembly.

**Installing**

1. Position the side shroud on the wheelchair frame.
2. Install the two (2) socket screws that secure the side shroud bracket into the mounting holes of the suspension arm. Securely tighten.
3. Install the mounting screw and washer that secures the REAR of the side shroud to the suspension arm.
4. Repeat STEPS 1-3 for the opposite side shroud assembly, if necessary.
5. Reinstall the drive wheel from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEEL in PROCEDURE 12 of this manual.
6. Reinstall the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.



**FIGURE 3 - REMOVING/INSTALLING SIDE SHROUD ASSEMBLY**

**REMOVING/INSTALLING COUNTERWEIGHT (FIGURE 4)**

**WARNING**

The sensor on the wheelchair should prevent the wheelchair from operating without the counterweight secured to the rear of the wheelchair. If the wheelchair operates without the counterweight, **DO NOT** operate the wheelchair. Have the wheelchair serviced by a dealer or qualified technician.

The counterweight weighs 42 pounds. Use proper lifting techniques (lift with your legs) to avoid injury.

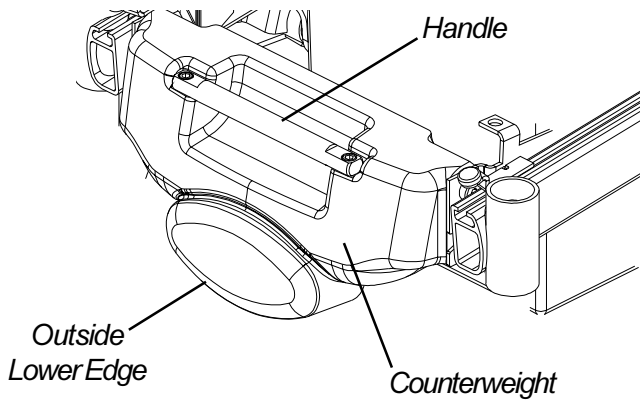
**Removing**

1. Remove the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
2. While using proper lifting techniques, use ONE hand to firmly grasp the handle and the OTHER hand to firmly grasp the OUTSIDE LOWER EDGE of the counterweight.
3. Pull the outside lower edge toward you, releasing the bottom shoulder screws on the counterweight from the bottom slots in the mounting brackets.
4. Lift the counterweight up and remove the top shoulder screws from the top slots in the mounting brackets.

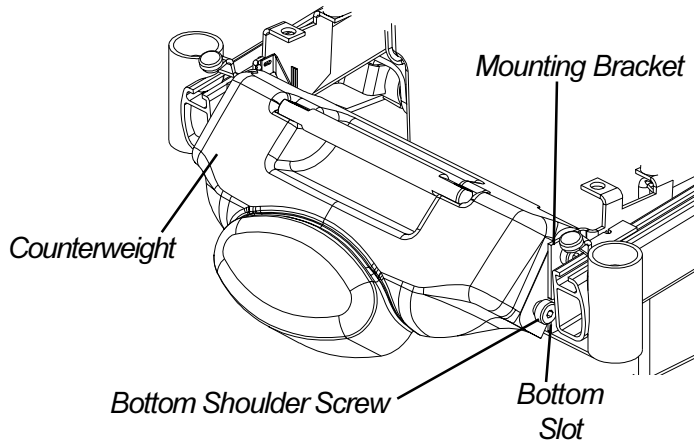
**Installing**

1. While using proper lifting techniques, use ONE hand to firmly grasp the handle and the OTHER hand to firmly grasp the OUTSIDE LOWER EDGE of the counterweight.
2. Hold the counterweight at an angle (DETAIL "C") and position the top shoulder screws into the top slots on the mounting brackets.
3. Lower the counterweight down until the bottom shoulder screws engage in the bottom slots on the mounting brackets.
4. Push in the bottom rear of the counterweight to secure the counterweight to the wheelchair until it locks into place (DETAIL "A").
5. Install the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.

DETAIL "A" - REMOVING - STEP 2;  
INSTALLING - STEP 5



DETAIL "B" - REMOVING - STEP 3;  
INSTALLING - STEPS 3, 4



DETAIL "C" - REMOVING - STEP 4;  
INSTALLING - STEP 2

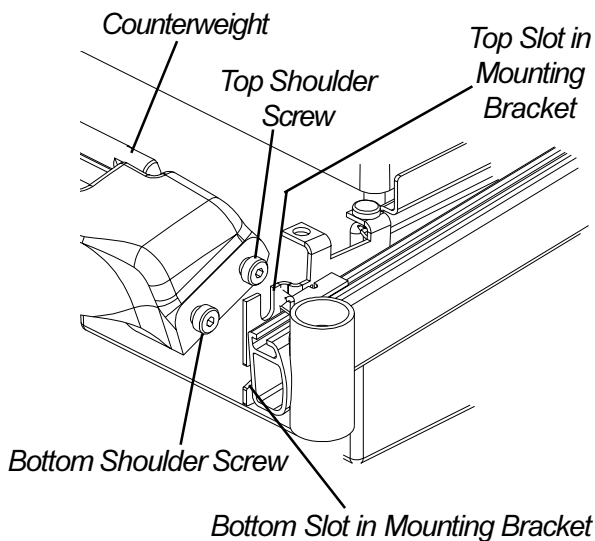


FIGURE 4 - REMOVING/INSTALLING  
COUNTERWEIGHT

## REPLACING GROUP 24 BATTERY BOX SUB-FRAME (FIGURE 5)

### Removing

1. Remove the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
2. Remove the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.
3. Remove the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
4. Cut tie wrap A, which secures the sensor cable **AND** the LEFT motor cable to the battery box sub-frame.
5. Cut tie-wrap B, which secures the battery charger cable **AND** the RIGHT motor cable to the battery box sub-frame.
6. Remove the two (2) mounting screws and locknuts that secure the wiring harness w/bracket to the battery box sub-frame.
7. Remove the wiring harness w/bracket from the battery box sub-frame.
8. Remove the four (4) mounting screws and washers that secure the battery box sub-frame to the mounting brackets.
9. Remove the EXISTING sub-frame assembly.
10. Remove the four (4) mounting screws and washers that secure the two (2) mounting brackets to the sub-frame.
11. Install the four (4) mounting screws and washers that secure the two (2) NEW mounting brackets to the sub-frame.
12. Install the four (4) mounting screws that secure the NEW battery box sub-frame to the mounting brackets. Use Loctite 242 and torque mounting screws to 156-inch pounds.
13. Install the two (2) mounting screws and locknuts that secure the wiring harness w/bracket to the NEW battery box sub-frame. Use Loctite 242 and torque mounting screws to 160-inch pounds.
14. Secure the sensor cable **AND** the LEFT motor cable to the NEW battery box sub-frame using tie wrap A. Refer to FIGURE 5 for tie wrap positioning.
15. Secure the battery charger cable **AND** the RIGHT motor cable to the NEW battery box sub-frame using tie wrap B. Refer to FIGURE 5 for tie wrap positioning.
16. Reinstall the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.

F  
W  
D  
W  
H  
E  
E  
L  
C  
H  
A  
I  
R  
S

17. Reinstall the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.

18. Reinstall the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.

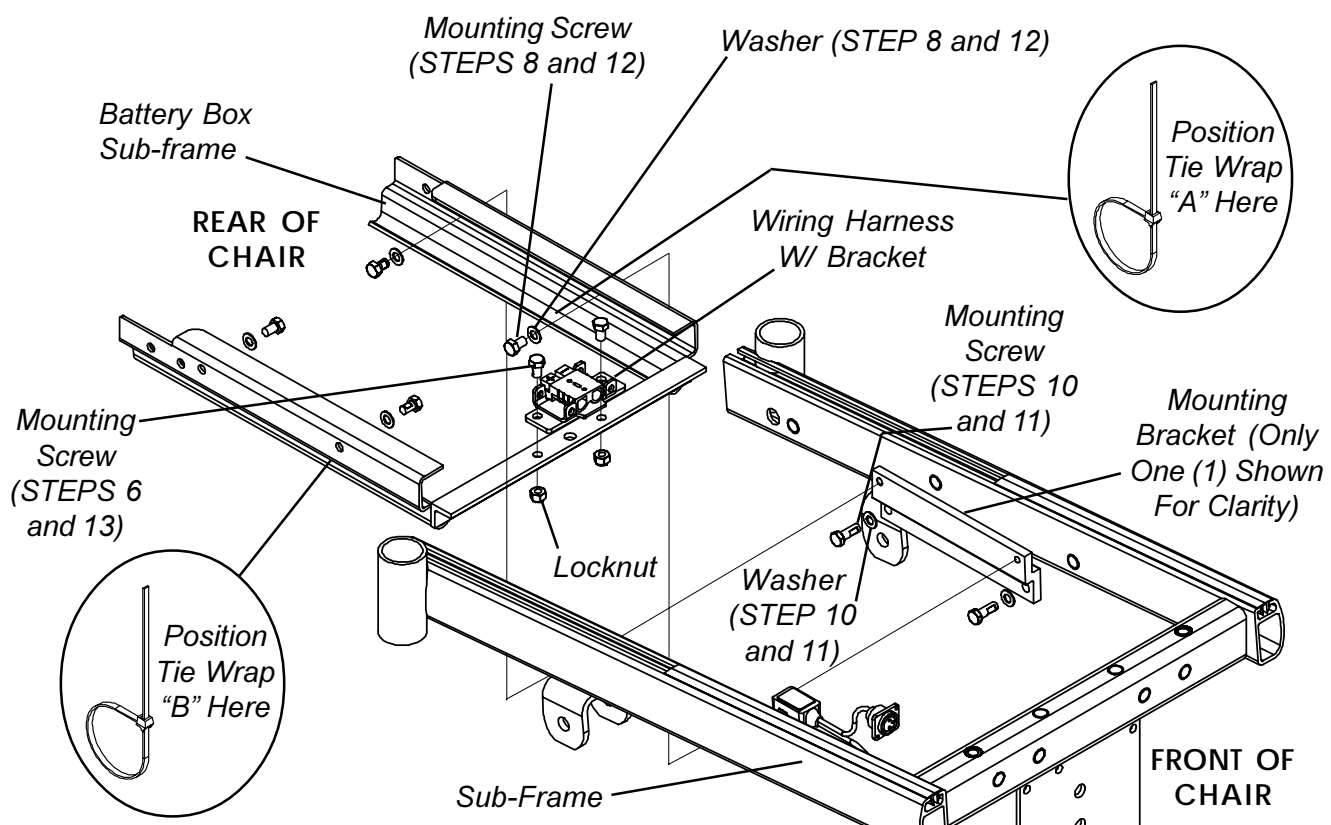


FIGURE 5 - REMOVING/INSTALLING GROUP 24 BATTERY BOX SUB-FRAME

**REMOVING/INSTALLING SHOCKS (FIGURE 6)**

**Removing**

1. Remove the front shroud. Refer to REMOVING/INSTALLING FRONT SHROUD in this procedure of the manual.
2. Remove the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
3. Remove the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.
4. Remove the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
5. Remove the mounting screw and washer that secures the top of the EXISTING shock to the base frame.
6. Remove the mounting screw and locknut that secures the bottom of the EXISTING shock to the suspension arm.
7. Remove the EXISTING shock.

**Installing**

1. Secure the top of the NEW shock to base frame using the existing washer and mounting screw. Apply Loctite 242 and torque to 156-inch pounds.
2. Secure the bottom of the NEW shock to the suspension arm with the existing mounting screw and locknut. Apply Loctite 242 and torque to 160-inch pounds.
3. Reinstall the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
4. Reinstall the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.
5. Reinstall the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
6. Reinstall the front shroud. Refer to REMOVING/INSTALLING FRONT SHROUD in this procedure of the manual.

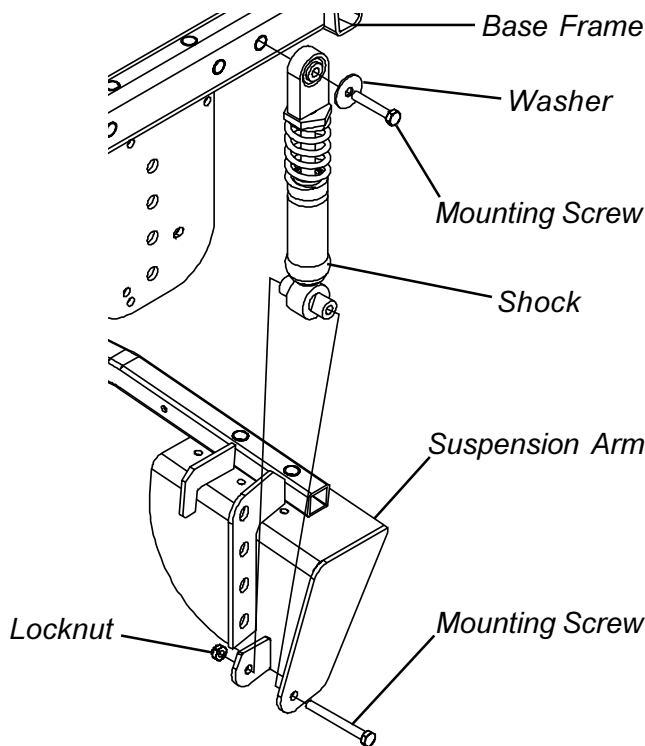


FIGURE 6 - REMOVING/INSTALLING SHOCKS

**SHOCK SPRING REPLACEMENT (FIGURE 7)**

1. Remove the shock. Refer to REMOVING/INSTALLING SHOCKS in this procedure of this manual.
2. Hold the spring retainer and turn the shock eyelet assembly counterclockwise to unthread it from the shock.
3. Remove the spring retainer and spring.
4. Place the NEW spring onto the shock.
5. Reinstall the shock eyelet assembly and the spring retainer onto the NEW spring.
6. While holding the spring retainer, torque the shock eyelet assembly to 245-inch pounds.

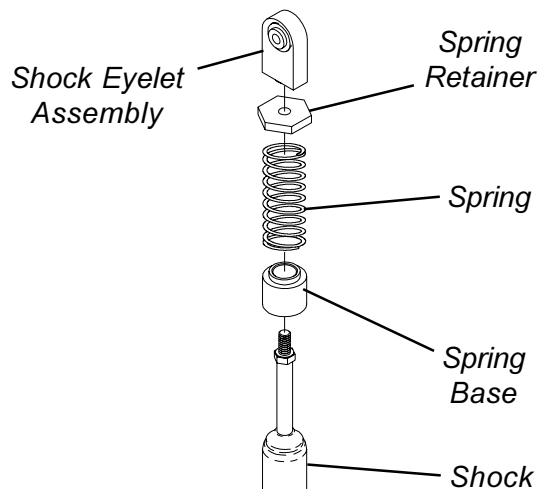


FIGURE 7 - SHOCK SPRING REPLACEMENT

7. Secure top of shock and spring retainer to base frame. Apply Loctite 242 and torque to 160-inch pounds.
8. Reinstall the shock. Refer to REMOVING/INSTALLING SHOCKS in this procedure of this manual.

**TIE ROD REPLACEMENT (FIGURE 8)**

**Removing**

1. Remove the front shroud. Refer to REMOVING/INSTALLING FRONT SHROUD in this procedure of the manual.
2. Remove the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
3. Remove the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.
4. Remove the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
5. Remove the shocks. Refer to REMOVING/INSTALLING SHOCKS in this procedure of this manual.
6. Remove the MKIV controller. Refer to REMOVING/INSTALLING MKIV CONTROLLER in PROCEDURE 13 of this manual.
7. Remove the locknut, small washer, larger washer and mounting screw that secures the tie rod to the suspension arm.
8. Remove the locknut, small washer, large washer and mounting screw that secures the tie rod to the base frame.
9. Remove the tie rod from the wheelchair.

*NOTE: In order to ensure that the replacement tie rod(s) are adjusted properly, it is necessary to remove ALL of the tie rods from the wheelchair and install both the NEW and the EXISTING tie rods as described in the section below.*

10. Repeat STEPS 7-9 to remove the three (3) remaining tie rods.

**Adjusting/Installing**

1. Before installing, adjust the collar on one (1) tie rod until the length of the tie rod is approximately five (5) inches (DETAIL "A").

*NOTE: The length of the tie-rod is measured from the center of one eyelet to the center of the opposite eyelet.*

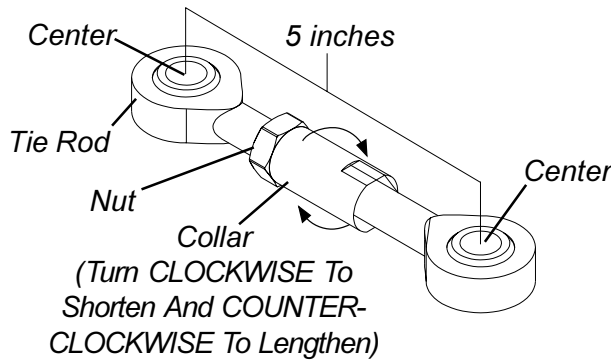
*NOTE: Turn the collar CLOCKWISE to shorten the tie rod and COUNTER-CLOCKWISE to lengthen the tie rod.*

2. Lock the collar on the tie rod into place by turning the nut on the tie rod until it is FLUSH against the collar (DETAIL "A").

3. Install the tie rod onto the base frame using the mounting screw, large washer, small washer and locknut. **HAND TIGHTEN ONLY.**
4. Install the tie rod in the suspension arm using the mounting screw, large washer, small washer and locknut. **HAND TIGHTEN ONLY.**
5. Repeat STEPS 1-4 to install the three (3) remaining tie rods.

*NOTE: To complete proper tie rod adjustment, Perform STEPS 6-7 on the TOP TWO (2) tie rods ONLY.*

6. Turn the collar **COUNTER-CLOCKWISE** for one (1) complete revolution on the **TOP TWO (2)** tie rods.
7. Lock the collar on the **TOP TWO (2)** tie rods into place by turning the nuts on the **TOP TWO (2)** tie rods until they are **FLUSH** against the collars.



DETAIL "A"

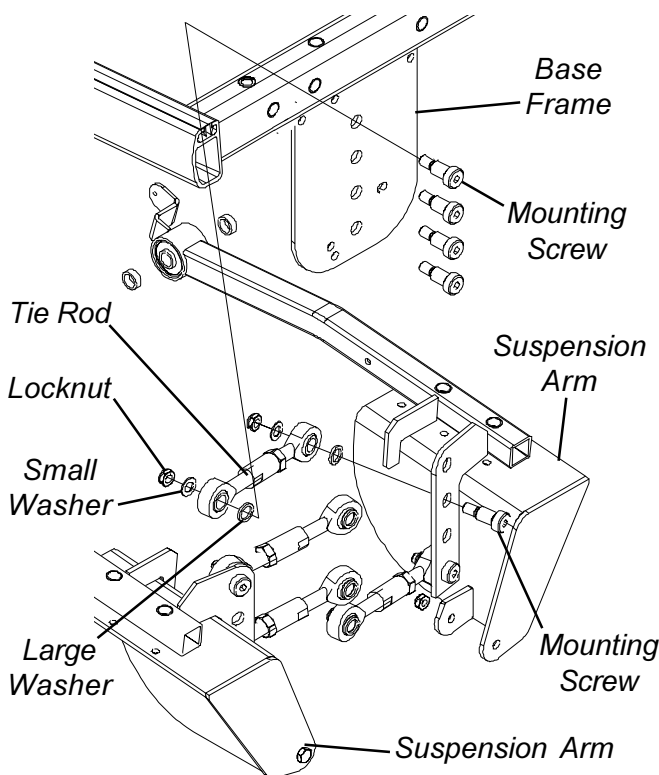


FIGURE 8 - TIE ROD ASSEMBLIES

8. Securely tighten the tie rods to the base frame **AND** to the suspension arm. Apply Loctite 242 and torque to 360-inch pounds.
9. Reinstall the MKIV controller. Refer to REMOVING/INSTALLING MKIV CONTROLLER in PROCEDURE 13 of this manual.
10. Reinstall the shocks. Refer to REMOVING/INSTALLING SHOCKS in this procedure of this manual.
11. Reinstall the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
12. Reinstall the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.
13. Reinstall the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
14. Reinstall the front shroud. Refer to REMOVING/INSTALLING FRONT SHROUD in this procedure of the manual.

## REMOVING/INSTALLING GEARBOX (FIGURE 9)

### CAUTION

Perform the following procedure in a designated work area to prevent damage to flooring (carpeting, tile, etc.).

### Removing

1. Remove the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
2. Remove the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.
3. Remove the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
4. Remove the drive wheel from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
5. Remove the side shroud assembly. Refer to REMOVING/INSTALLING THE SIDE SHROUD in this procedure of the manual.
6. Remove the six (6) socket screws that secure the existing motor/gearbox to the suspension arm.
7. Remove existing motor from gearbox. Refer to MOTOR REPLACEMENT in PROCEDURE 12 of this manual.



**Installing**

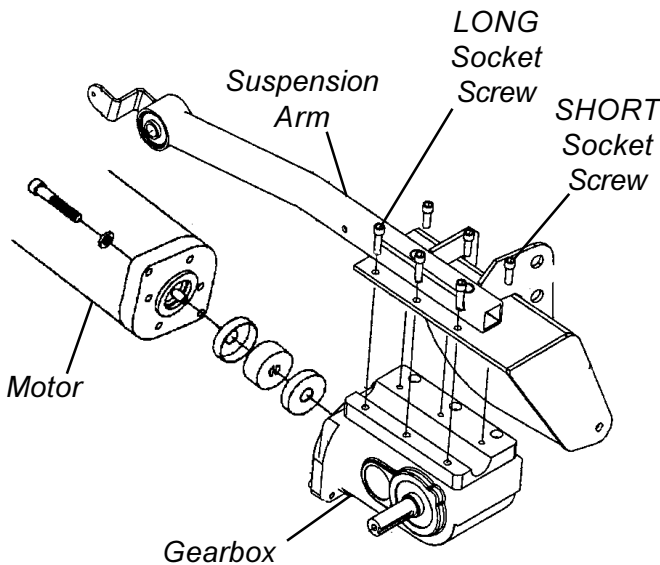
**CAUTION**

The longer socket screws **MUST** be positioned in the mounting holes on the **OUTSIDE** of the suspension arm, and the **SHORTER** socket screws **MUST** be positioned in the mounting holes on the **INSIDE** of the suspension arm. Otherwise, damage to the gearbox may result.

1. Install the EXISTING motor onto the NEW gearbox. Refer to MOTOR REPLACEMENT in PROCEDURE 12 of this manual.
2. Secure the gearbox to the suspension arm using the six (6) socket screws. Use Loctite 242 and torque the socket screws to 75-inch pounds.

*NOTE: Replace any parts that show signs of wear or damage.*

3. Reinstall the side shroud assembly. Refer to REPLACING THE SIDE SHROUD in this procedure of the manual.
4. Reinstall the drive wheels onto the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.



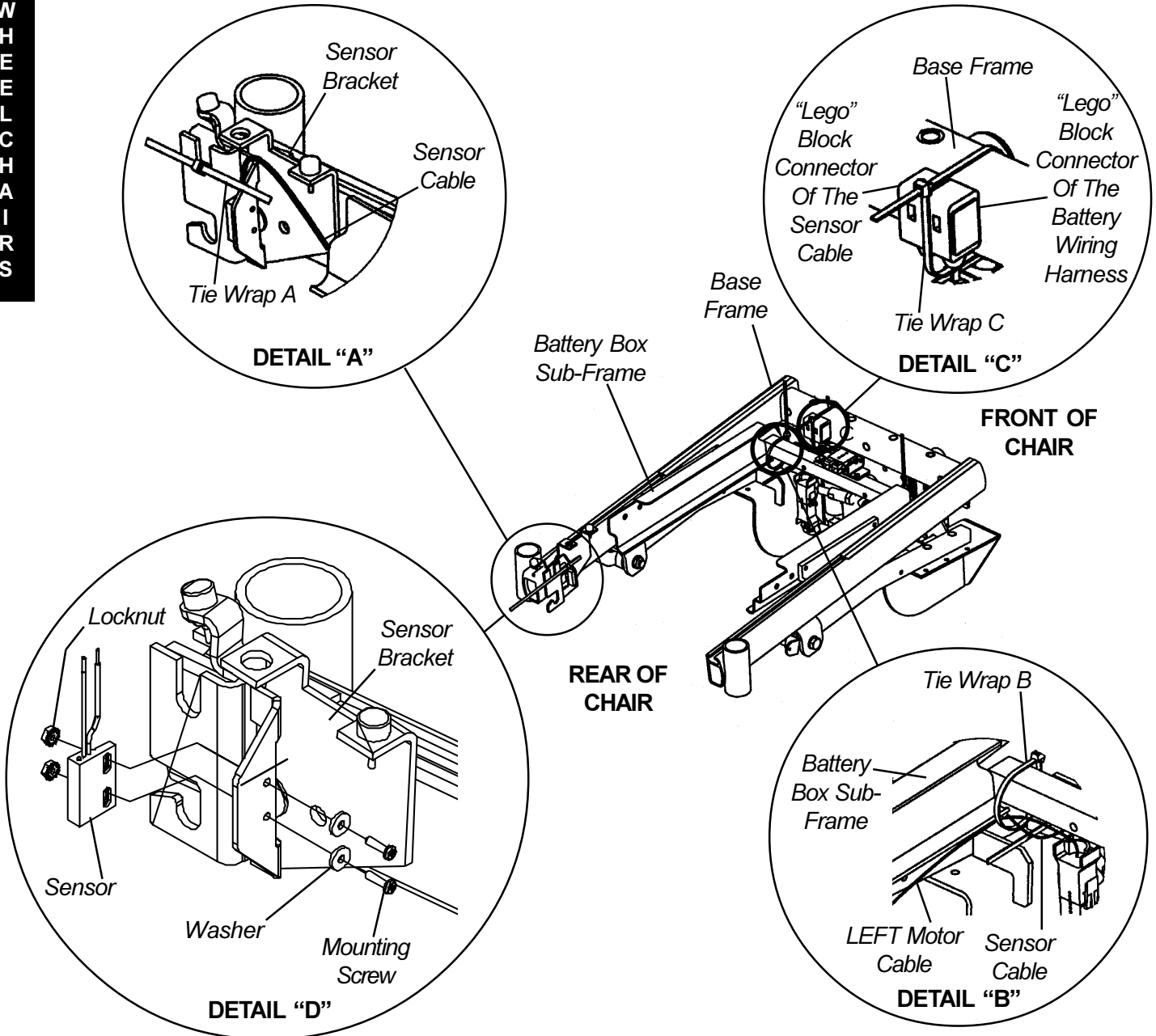
**FIGURE 9 - REMOVING/INSTALLING GEARBOX**

5. Reinstall the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
6. Reinstall the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.
7. Reinstall the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.

**SENSOR CABLE ASSEMBLY REPLACEMENT (FIGURE 10)**

1. Remove the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
2. Remove the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.
3. Remove the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
4. Cut tie-wrap A, which secures the EXISTING sensor cable to the sensor bracket (DETAIL "A").
5. Cut tie-wrap B, which secures the EXISTING sensor cable AND the LEFT motor cable to the battery box sub-frame (DETAIL "B").
6. Cut tie-wrap C, which secures the EXISTING "Lego" block connector of the sensor cable and the "Lego" block connector of the battery wiring harness to the base frame.
7. Disconnect the EXISTING "Lego" block connector of the sensor cable from the "Lego" block connector of the battery wiring harness (DETAIL "C").
8. Remove the two (2) mounting screws, washers and locknuts that secure the EXISTING sensor to the sensor bracket (DETAIL "D").
9. Remove the EXISTING sensor cable assembly.
10. Install the two (2) mounting screws, washers and locknuts to secure the NEW sensor to the sensor bracket (DETAIL "D"). Securely tighten.
11. Connect the NEW "Lego" block connector of the sensor cable assembly to the "Lego" block connector of the wiring harness (DETAIL "C").
12. Secure the two (2) "Lego" block connectors to the base frame with a NEW tie wrap (DETAIL "C").
13. Secure the NEW sensor cable AND the LEFT motor cable to the battery box sub-frame with a NEW tie wrap (DETAIL "B").

14. Secure the NEW sensor cable to the sensor bracket with a NEW tie wrap (DETAIL "A").
15. Reinstall the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
16. Reinstall the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.
17. Reinstall the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.



NOTE: Seat frame and drive wheels removed for clarification purposes ONLY.

FIGURE 10 - SENSOR CABLE ASSEMBLY REPLACEMENT

**REPLACING SUSPENSION ARM (FIGURE 11)**

1. Remove the rear shroud. Refer to REMOVING/INSTALLING REAR SHROUD in this procedure of the manual.
2. Remove the counterweight. Refer to REMOVING/INSTALLING COUNTERWEIGHT in this procedure of the manual.

3. Remove the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
4. Remove the drive wheel from the wheelchair. Refer to REMOVING/INSTALLING DRIVE WHEELS in PROCEDURE 12 of this manual.
5. Remove the shock. Refer to REMOVING/INSTALLING SHOCKS in this procedure of this manual.
6. Remove the tie rods from the EXISTING suspension arm. Refer to TIE ROD REPLACEMENT in this procedure of the manual.
7. Remove the side shroud assembly. Refer to REPLACING SIDE SHROUD ASSEMBLY in this procedure of the manual.
8. Remove the gearbox from the EXISTING suspension arm. Refer to REMOVING/INSTALLING GEARBOX in this procedure of the manual.
9. Remove the locknut, two (2) spacers, two (2) washers and the mounting screw that secures the EXISTING suspension arm to the base frame.
10. Remove EXISTING suspension arm from the base frame.
11. Secure the NEW suspension arm to the base frame using the mounting screw, two (2) washers, two (2) spacers and the locknut. Torque the locknuts to 85 -inch pounds.
12. Reassemble the wheelchair by reversing STEPS 1-8.

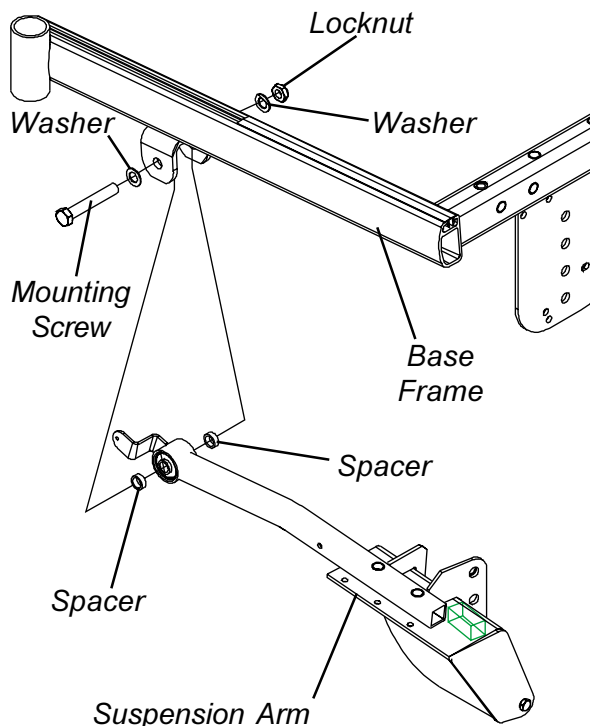


FIGURE 11 - REPLACING THE SUSPENSION ARM

## REMOVING/INSTALLING WIRING HARNESS (FIGURE 12)

### Removing

1. Remove the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.
2. Remove the two (2) mounting screws that secure the battery charger port to the mounting bracket and remove the battery charger port (DETAIL "A").
3. Remove the two (2) mounting screws and locknuts that secure the wiring harness w/bracket to the battery box sub-frame (DETAIL "B").
4. Cut tie-wrap A, which secures the "Lego" block connectors to the base frame (DETAIL "C").
5. Disconnect the "Lego" block connector of the battery wiring harness from the "Lego" block connector of the sensor cable assembly (DETAIL "C").
6. Cut tie-wrap B, which secures the battery charger cable and the RIGHT motor cable to the battery box sub-frame (DETAIL "D").
7. Disconnect the battery harness/charger cable (**BLUE**) from the controller connector (**BLUE**) (DETAIL "E").
8. Remove the wiring harness.

### Installing

1. Connect the battery harness/charger cable (**BLUE**) to the controller connector (**BLUE**) (DETAIL "E").
2. Connect the "Lego" block connector of the battery wiring harness to the "Lego" block connector of the sensor cable assembly (DETAIL "C").
3. Secure the "Lego" block connectors to the base frame with a NEW tie wrap (DETAIL "C").
4. Install the two (2) mounting screws and locknuts that secure the wiring harness w/bracket to the battery box sub-frame. Use Loctite 242 and torque mounting screws to 160-inch pounds (DETAIL "B").
5. Secure the battery charger cable and the RIGHT motor cable to the battery box sub-frame with a NEW tie wrap (DETAIL "D").

F  
W  
D  
W  
H  
E  
E  
L  
C  
H  
A  
I  
R  
S

- 6. Reinstall the mounting screw that secures the battery charger port to the mounting bracket (DETAIL "A"). Securely Tighten.
- 7. Reinstall the battery boxes. Refer to INSTALLING/REMOVING GROUP 24 BATTERY BOXES in PROCEDURE 9 of this manual.

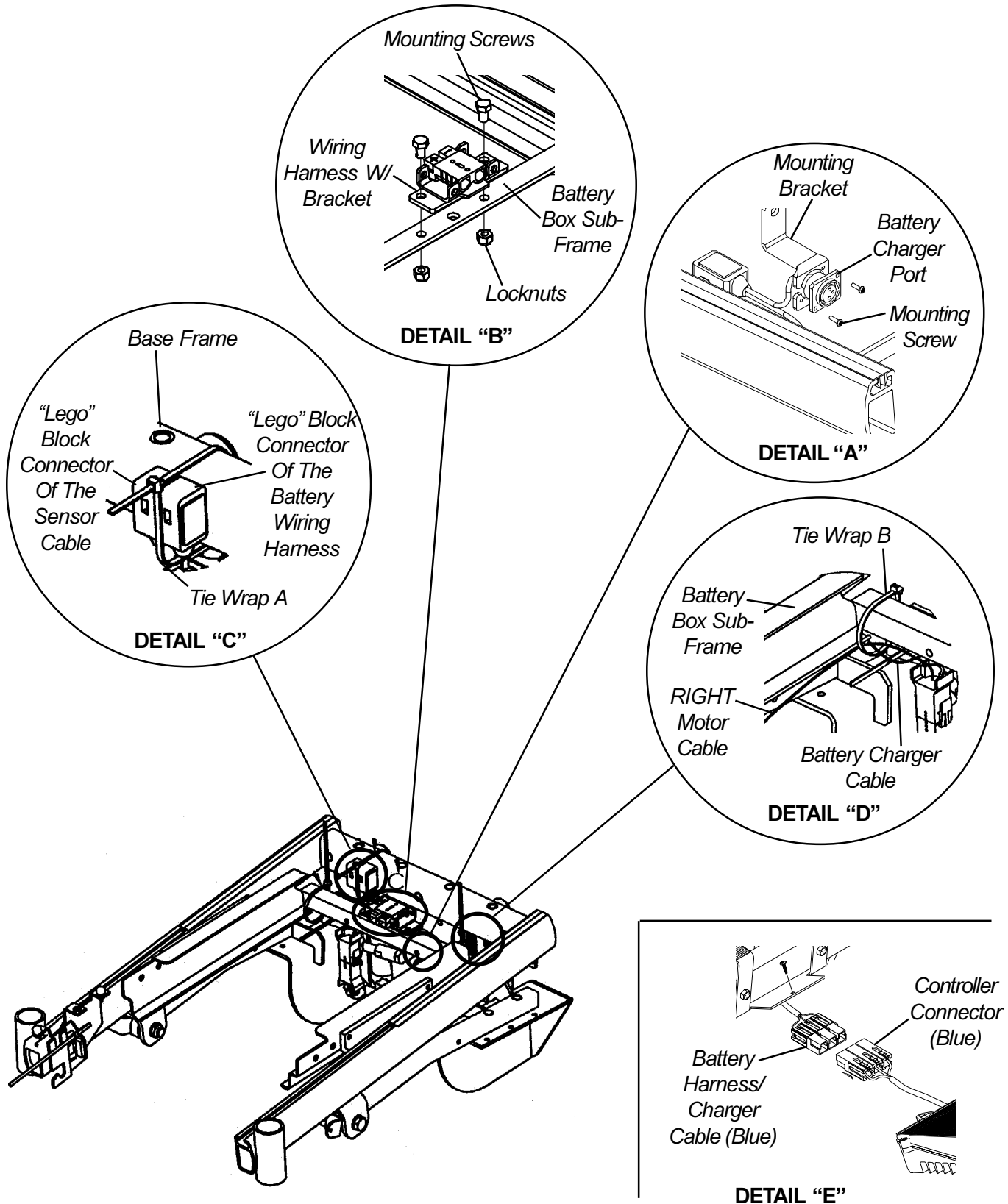


FIGURE 12 - REMOVING/INSTALLING WIRING HARNESS

### ADJUSTING WEIGHT DISTRIBUTION (FIGURE 13)

*NOTE: Depending on the seat depth ordered, the position of the seat support brackets is factory set between 2.25 and 6 inches (measured from the front of the base frame to the front of the seat support brackets). This will put approximately 65% of the total weight of the chair and user over the drive wheels (large wheels), allowing for the best performance of the chair.*

*In order to achieve maximum comfort and maneuverability for the end user, it may be necessary to adjust the seat support brackets slightly forward or backward. It is recommended that the seat support brackets be set as close to 2.25- 6 inch mark (depending on seat depth) as possible, while allowing maximum comfort and maneuverability to the end user.*

#### Adjusting Weight Distribution For New Seat Depth

*NOTE: When changing the seat depth of the chair, it is necessary to adjust the seat support brackets in order to achieve optimum weight distribution (65%). Perform the following procedure to adjust the seat brackets:*

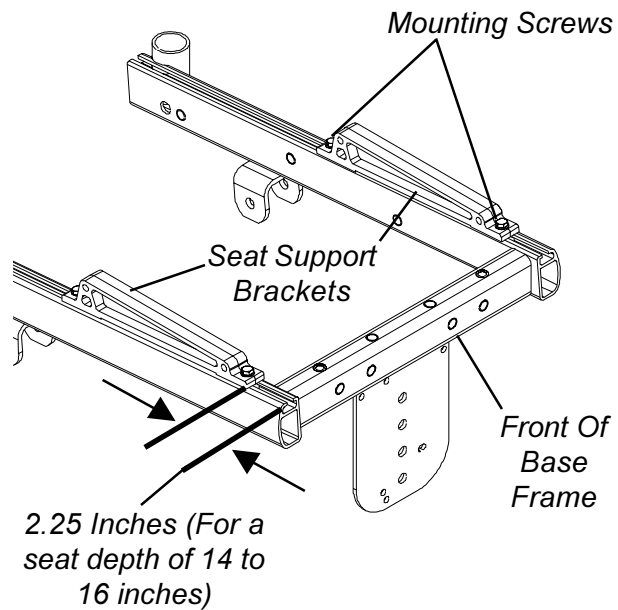
1. Refer to the following chart to determine the correct position of the two (2) seat support brackets to achieve optimum weight distribution (65%).

Seat Depth (Inches)	Position Of The Seat Support Brackets (Inches) To Achieve Optimum Weight Distribution (65%)
14 to 16 inches	2.25-inches
17 to 18 inches	4.25-inches
19 to 20 inches	6-inches

2. Loosen the four (4) mounting screws that secure the two (2) seat support brackets to the base frame.
3. Adjust the two (2) seat support brackets forward or backward until the position determined in STEP 1 is achieved.

*NOTE: When the front of the seat aligns with the controller, approximately 65% of the total weight of the chair and user is over the drive wheels (large wheels).*

4. Adjust the two (2) seat brackets slightly forward or backward, until maximum comfort and maneuverability for the end user is achieved.
5. Retighten the four (4) mounting screws securing the two (2) seat support brackets to the base frame.



*NOTE: Seat/seat frame not shown for clarity.*

FIGURE 13 - ADJUSTING WEIGHT DISTRIBUTION

### INSTALLING 90° FOOTBOARD (FIGURE 14)

**WARNING**  
DO NOT remove detent pin from footrest assembly. Otherwise, injury may result.

1. Remove the existing footrests. Refer to FRONT RIGGING in PROCEDURE 3 of the Owner's manual, part number 1081227.
2. Remove the telescoping front rigging supports. Refer to ADJUSTING/REPLACING TELESCOPING FRONT RIGGING SUPPORT in PROCEDURE 3 of the Owner's Manual, part number 1081227.
3. Remove existing front and rear shrouds. Refer to REMOVING/INSTALLING THE REAR SHROUD and REMOVING/INSTALLING THE FRONT SHROUD in this procedure of the Manual.
4. Remove the seat. Refer to REMOVING/INSTALLING THE SEAT FRAME in PROCEDURE 6 of this Manual.
5. Position the 90° footboard on the base frame as shown in FIGURE 14.
6. Loosely install one (1) mounting screw into the back of the footboard and into the base frame.
7. Loosely install two (2) mounting screws and washers through the top of the footboard and into the base frame.
8. Torque all three (3) mounting screw between 15 and 19-foot pounds.

9. Adjust angle of footrest. Refer to FOOTREST ANGLE ADJUSTMENTS in this procedure of the Manual.
10. Install the seat. Refer to REMOVING/INSTALLING THE SEAT FRAME in PROCEDURE 6 of this manual.
11. Install NEW front shroud and existing rear shroud. Refer to REMOVING/INSTALLING THE REAR SHROUD and REMOVING/INSTALLING THE FRONT SHROUD in this procedure of the Manual.
12. Install the two (2) end caps provided into the ends of the seat frame where the telescoping front rigging supports were mounted.
13. Adjust footboard. Refer to DEPTH/HEIGHT/ANGLE ADJUSTMENT in this procedure of the manual.

**FOOTBOARD ADJUSTMENTS-  
DEPTH/HEIGHT/ANGLE  
(FIGURE 15)**

**WARNING**  
DO NOT remove detent pin from footrest assembly. Otherwise, injury may result.

**Depth**

1. Remove the four (4) flat screws, washers and locknuts that secure 90° footboard to the two (2) half clamps.
- NOTE: Observe the angle of the footboard for reinstallation.*
2. Move footboard to one (1) of two (2) mounting positions.
  3. Secure the footboard to the half clamps with the four (4) flat screws, washers and locknuts. Securely tighten.

**Angle**

1. Loosen, but do not remove the four (4) flat screws, washers and locknuts that secure the footplate to the half clamps.
2. Position the 90° footboard to the desired angle.
3. Retighten four (4) flat screws, washers and locknuts.

**Height**

1. Remove the two (2) hub caps.
2. Remove the mounting screw, washers, caplug washers, and locknut that secure the footboard to the footrest support.
3. Adjust footboard to desired height.
4. Secure the footboard with the mounting screw, washers, caplug washers, and locknut. Tighten mounting screw and locknut to 12 foot pounds. See FIGURE 15 for hardware orientation.

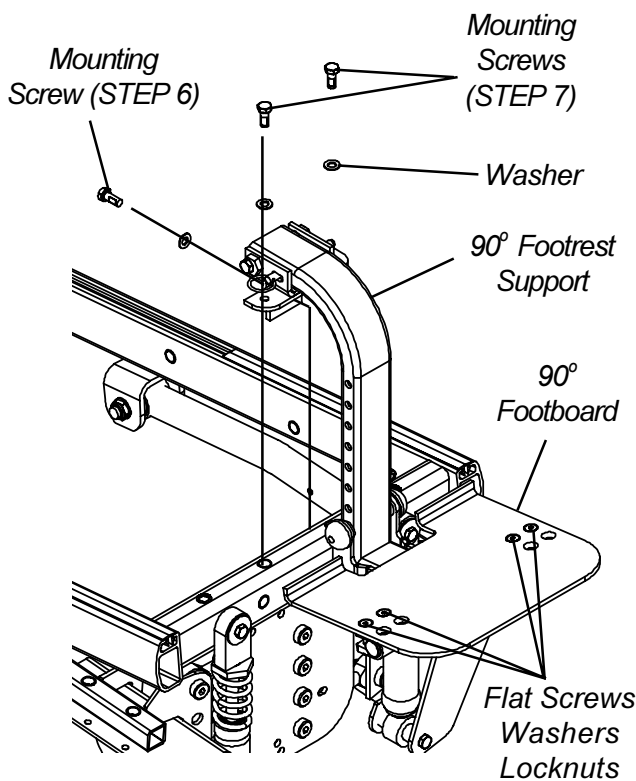
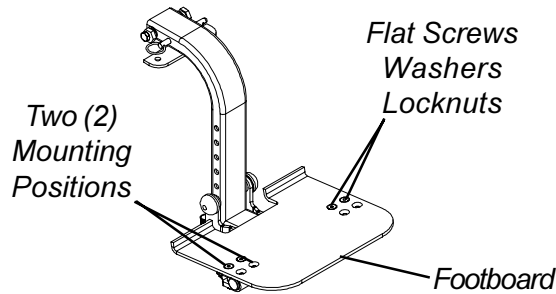


FIGURE 14 - INSTALLING 90° FOOTBOARD

DEPTH



ANGLE/HEIGHT

Side View Of 90° Footboard

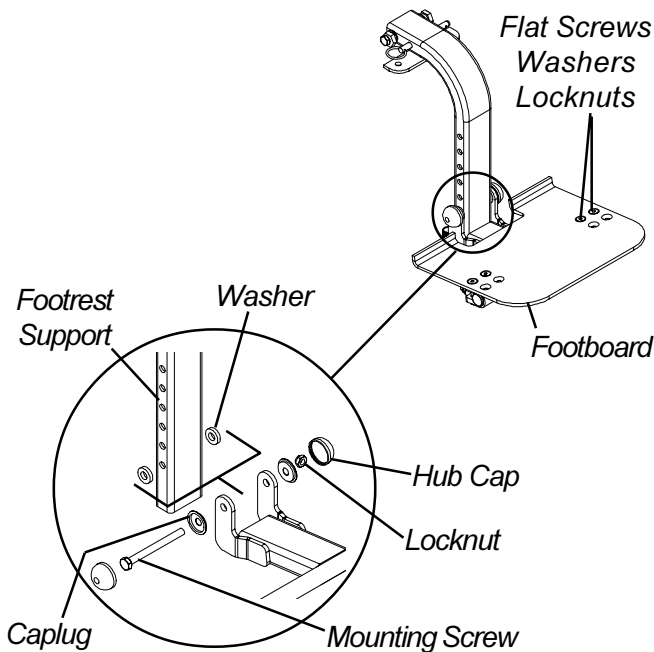
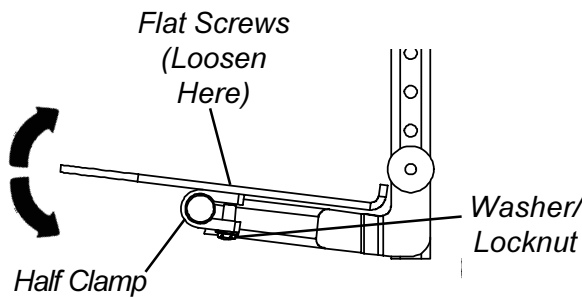


FIGURE 15 - DEPTH/HEIGHT/ANGLE ADJUSTMENT

FOOTREST ANGLE ADJUSTMENTS

**WARNING**  
DO NOT remove detent pin from footrest assembly. Otherwise, injury may result.

**Footrest Angle Adjustment Relative to the Vertical Position of the Front Shroud (FIGURE 16)**

NOTE: The angle of the footrest relative to the vertical position of the front shroud can be increased or decreased by adjusting both cams located at the top of the footrest support.

1. Loosen the mounting screw and locknut that secure the cams to the upper mounting bracket. Refer to DETAIL "A".

NOTE: Both cams MUST be rotated to the same position to keep the footrest square to the base.

2. Rotate both cams either direction until footrest is at desired angle. Refer to DETAIL "B" and "C"
3. Tighten mounting screw and locknut to 12 foot pounds.

**Footrest Angle Adjustment Relative to the Horizontal Position of the Front Shroud (FIGURE 16)**

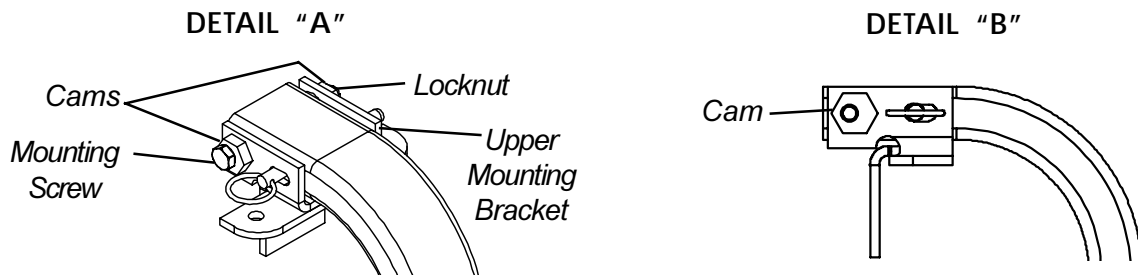
NOTE: The footrest is factory set to be square to the base when installed. The footrest can be positioned to be out of square by adjusting only one (1) of the cams located at the top of the footrest support.

1. Loosen the mounting screw and locknut that secure the cams to the upper mounting bracket. Refer to DETAIL "A".
2. Perform one (1) of the following:

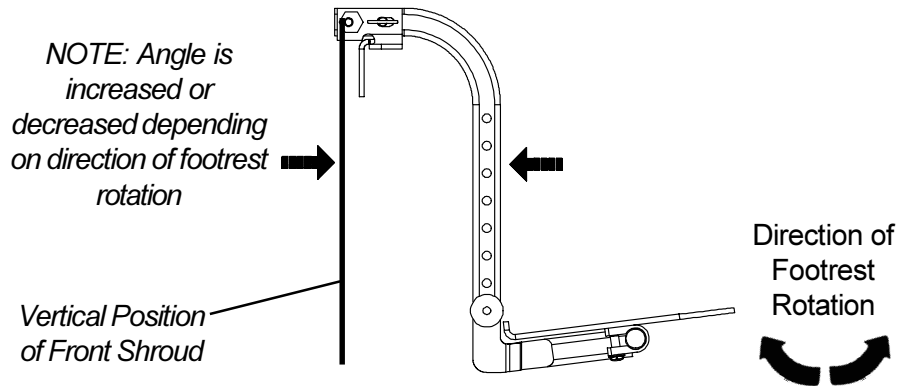
NOTE: Right and Left are determined by sitting in the wheelchair.

- A. Turning the right cam will rotate the footrest counter-clockwise. Refer to DETAIL "D".
- B. Turning the left cam will rotate the footrest clockwise. Refer to DETAIL "D".

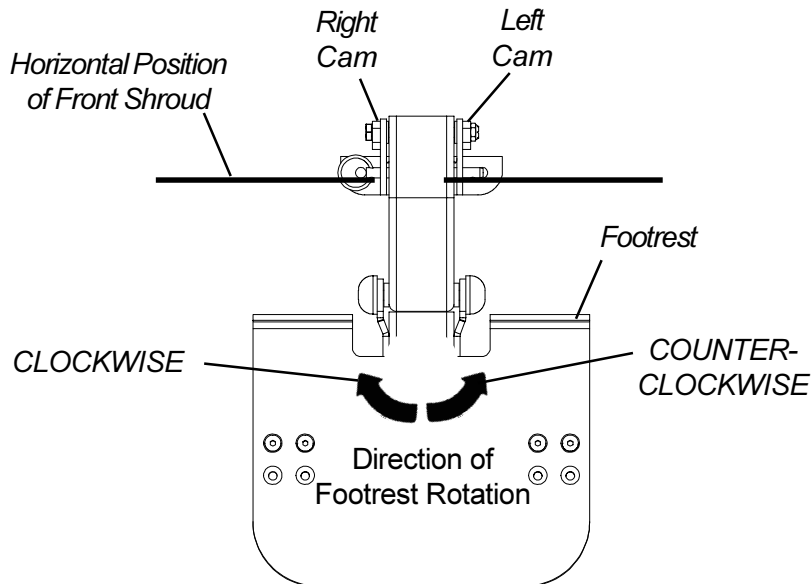
3. When footrest is at desired position, tighten mounting screw and locknut to 12 foot pounds.



**DETAIL "C" - SIDE VIEW OF FOOTREST**



**DETAIL "D" - TOP VIEW OF FOOTREST**



**FIGURE 16 - FOOTREST ANGLE ADJUSTMENTS**



**NOTES**

NOTES



**LIMITED WARRANTY**

PLEASE NOTE: THE WARRANTY BELOW HAS BEEN DRAFTED TO COMPLY WITH FEDERAL LAW APPLICABLE TO PRODUCTS MANUFACTURED AFTER JULY 4, 1975.

This warranty is extended only to the original purchaser/user of our products.

This warranty gives you specific legal rights and you may also have other legal rights which vary from state to state.

Invacare warrants seat frame to be free from defects in materials and workmanship for a period of three (3) years from date of purchase; that electrical components are warranted for a period of one (1) year; gearbox/motors for a period of 18 months; and gearless/brushless motors for five (5) years from the date of purchase; and the base frame for the life of the product; all remaining components (including gas cylinders and motor lock pads) for one (1) year from the date of purchase except upholstered materials, padded materials and tires/wheels. If within such warranty period any such product shall be proven to be defective, such product shall be repaired or replaced, at Invacare's option. This warranty does not include any labor or shipping charges incurred in replacement part installation or repair of any such product. Invacare's sole obligation and your exclusive remedy under this warranty shall be limited to such repair and/or replacement.

This warranty pertains to Arrow Series, Ranger X Series and Torque Series Only!

For warranty service, please contact the dealer from whom you purchased your Invacare product. In the event you do not receive satisfactory warranty service, please write directly to Invacare at the address at the bottom of the back cover. Provide dealer's name, address, date of purchase, indicate nature of the defect and, if the product is serialized, indicate the serial number. Do not return products to our factory without our prior consent.

**LIMITATIONS AND EXCLUSIONS:** THE FOREGOING WARRANTY SHALL NOT APPLY TO SERIAL NUMBERED PRODUCTS IF THE SERIAL NUMBER HAS BEEN REMOVED OR DEFACED, PRODUCTS SUBJECTED TO NEGLIGENCE, ACCIDENT, IMPROPER OPERATION, MAINTENANCE OR STORAGE, COMMERCIAL OR INSTITUTIONAL USE, PRODUCTS MODIFIED WITHOUT INVACARE'S EXPRESS WRITTEN CONSENT INCLUDING, BUT NOT LIMITED TO, MODIFICATION THROUGH THE USE OF UNAUTHORIZED PARTS OR ATTACHMENTS; PRODUCTS DAMAGED BY REASON OF REPAIRS MADE TO ANY COMPONENT WITHOUT THE SPECIFIC CONSENT OF INVACARE, OR TO A PRODUCT DAMAGED BY CIRCUMSTANCES BEYOND INVACARE'S CONTROL, AND SUCH EVALUATION WILL BE SOLELY DETERMINED BY INVACARE. THE WARRANTY SHALL NOT APPLY TO PROBLEMS ARISING FROM NORMAL WEAR OR FAILURE TO ADHERE TO THESE INSTRUCTIONS.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, IF ANY, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE DURATION OF THE EXPRESS WARRANTY PROVIDED HEREIN AND THE REMEDY FOR VIOLATIONS OF ANY IMPLIED WARRANTY SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT PURSUANT TO THE TERMS CONTAINED HEREIN. INVACARE SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES WHATSOEVER.

THIS WARRANTY SHALL BE EXTENDED TO COMPLY WITH STATE/PROVINCIAL LAWS AND REQUIREMENTS.

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